IRON AGE
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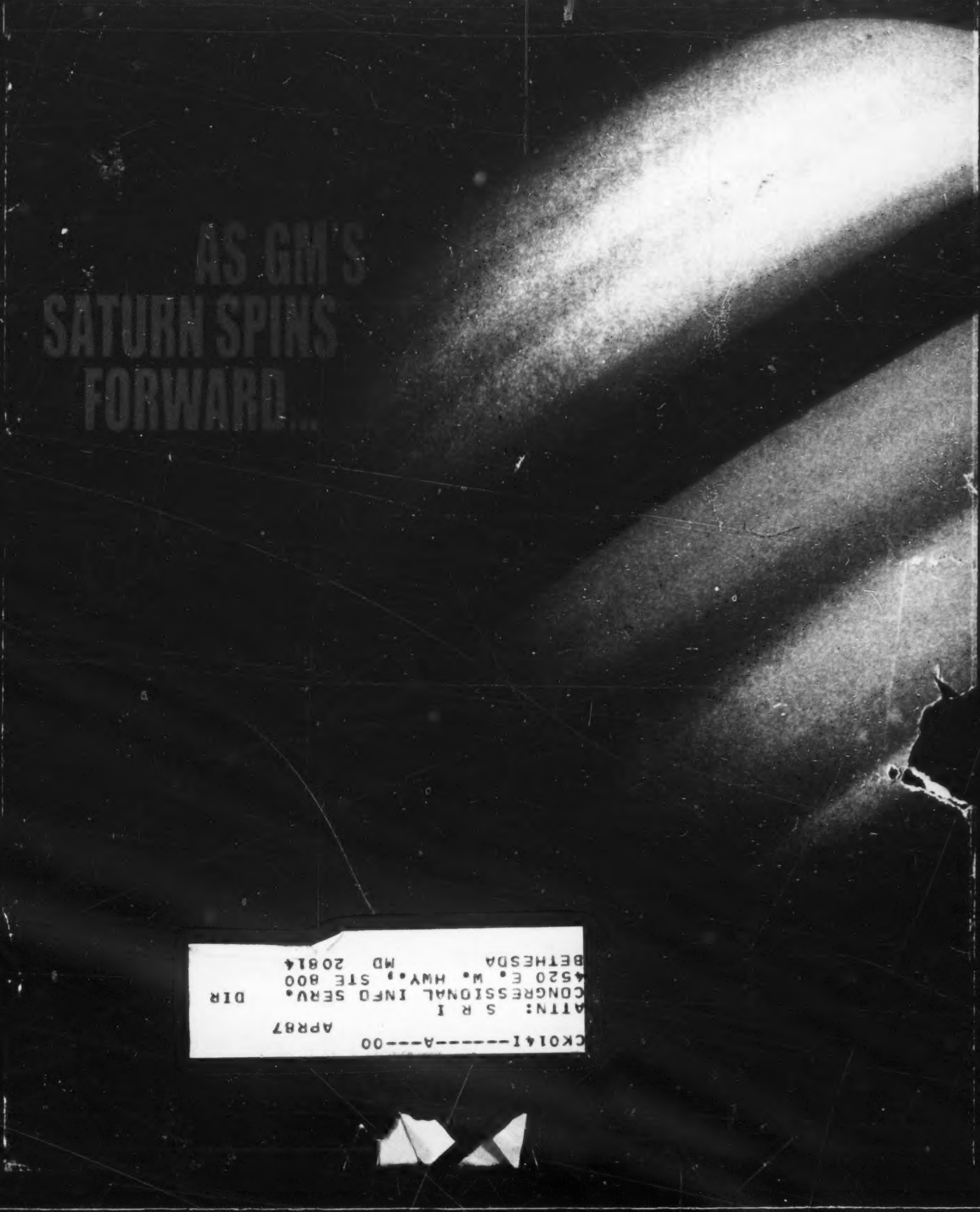
NOVEMBER 7, 1986

MANUFACTURING MANAGEMENT



AS GM'S SATURN SPINS FORWARD...

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NOVEMBER 7, 1986 VOL. 229, NO. 21

IRON AGE
MANUFACTURING MANAGEMENT

SATURN
CORPORATION

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WILL LOSER STEEL BECOME A WINNER?

Though it can now produce steel cheaper than our leading trading partners, more time is needed to put it back in the winner's circle.

BY JOHN D. BAXTER

"Almost all of steel's major markets will show a decline in 1987."

That's the forecast of Peter B. Mulloney, vice president and assistant to the chairman at USX Corp.

The forecast was not a surprising one. But there is still a startling aspect to it; it was made for a year that almost certainly will be the fifth straight one of economic expansion in this country.

The 'great lag' is not an affliction felt solely by the steel industry.

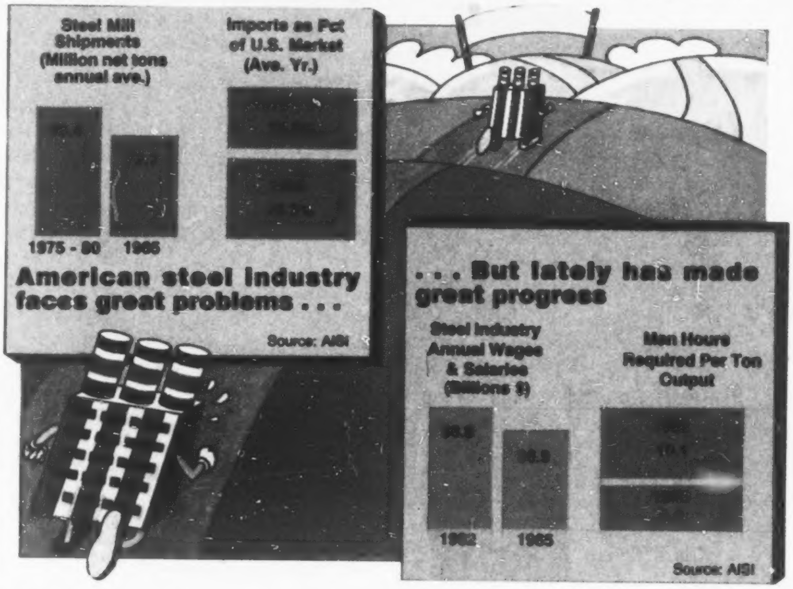
Mr. Mulloney gave the forecast at a recent Conference Board meeting where he was one of the panelists. In a separate session, another panelist, economist Lawrence Chimerine, said, "I don't ever remember such weaknesses so late in a business expansion period as we are now seeing in critical areas such as industrial production and capital investment."

Mr. Chimerine is chairman and chief economist of the forecasting firm, Chase Econometrics.

The analyses made at the meeting by the steel executive and the economist—and others—made it seem that a consensus has developed on an explanation of why the manufacturing sector, especially basic goods producers, is showing negative numbers even as the overall economy continues to gain.

The view is held that the manufacturing sector has been battered by a powerful one-two punch. The entire economy has been hit, but the manufacturing sector's chin seems to be the most vulnerable.

Punch One has been an explosion of manufactured goods imports. U.S. trade in manufactured goods has reeled from a near $12 billion *surplus* in 1984 to a current annual *deficit* running at about $125 billion.



Punch Two has been the recent sluggish and sliding U.S. economy. The economy has grown, but growth has been too weak to give a lift to the manufacturing sector, where the growth rate has lagged well behind that of the overall economy. Real GNP slipped from a 6.4 pct growth rate in 1984 to 2.7 pct last year, and is widely expected to slow further this year to a piddling 2.2 pct.

If the one-two punch is looked at as a single blow, it becomes clear that the real knockout punch has come from imports. Simply, the manufacturing sector, groggy from the imports shot, was not up to taking the second blow—the slowed economy.

Steel Hit Hard

Few industries have been hit harder by soaring imports than the steel industry. That industry's biggest market, the capital goods sector, has been overwhelmed by a flood of imports. On top of that, indirect steel trade—imports of steel-intensive finished goods—has also robbed the domestic industry of huge chunks of its home markets.

These points about the American steel industry were brought out clearly by Mr. Mulloney. At the same time, he offered a fresh, and optimistic, appraisal of the long-term state of steel demand in this country.

First, Mr. Mulloney gave the forecast numbers. Then, as he said, he looked at "some of the fundamental factors that will affect the industry in 1987 and beyond."

The number on steel consumption in the U.S. for next year he saw was 83 million tons. That to-

◆ For Information, Circle 81

Bad News for Steel's Primary Market

"There is no way that capital spending can be a leading factor in the economy next year, or the next."

That dour forecast was voiced by Chase Econometric's Lawrence Chimerine at the recent Conference Board meeting where he served as a panelist along with USX's Peter B. Mulloney.

The economists' capital spending forecast was bad news for Mr. Mulloney. After all, in his own talk, the steel executive had noted that capital spending is the prime consumer of steel, accounting for 70 pct of all that is chewed up in this country.

"In the past 12 to 15 months," said Mr. Chimerine, "capital spending has just about stagnated. There are simply no signs of any imminent pick-up."

The economist raised the question, "Does the recent weakness in capital spending reflect uncertainty about the new tax bill, or is the weakness due to something more fundamental?"

He found the problem in weak fundamentals. For one, he cited "relatively low" capacity utilization rates at factories.

"This is the first time in my memory," he said, "that there have been such low plant usage rates this late in an economic recovery."

The economist found two other basic indicators of plant spending pointing down—ones relating to industry's wherewithal to acquire new plants and equipment.

"For about 18 months now," he noted, "there has been little or no growth in corporate profits.

"At the same time, there has developed a pile-up of corporate debt. My clients tell me they are using up most of their cash flow to pay off debts, not to spend for new equipment."

Then there is the most fundamental of all indicators of capital investment—the state of the economy. Here again, Mr. Chimerine was downbeat.

"The outlook," he said, "is for continued sluggish economic growth. Companies are planning cautiously on the basis of continued soft demand ahead. That certainly doesn't bode well for plant spending."

Mr. Chimerine also sees unfavorable signs for capital investment in the government fiscal policy area. "Government fiscal policies," he said, "due to severe spending constrictions, remain restrictive. There are no signs of stimulus to investment from this quarter.

"Further, it appears that the new tax bill, on balance, will put a crimp in plant spending. Business will have winners and losers. The losers will tend to be capital-intensive ones—the big buyers of plant and equipment."

He noted the signs in the economy widely hailed as "favorable"—lowered interest rates, low oil prices, the low rate of general inflation and the softer dollar. He sees these signs as "mixed," for capital spending, rather than all pluses.

"Real interest rates," he noted, "are still prohibitively high. It is still costly, in terms of real interest rates, for a company to build new plants or buy new equipment."

Morever, he pointed out that low oil prices have led to severe cutbacks in capital spending by the petroleum industry.

The falling dollar, he said, will take time and more time before it gives a lift to plant investment.

tal would be down from the 87 million expected for this year, and down further from the 93 million tons recorded in 1985.

In steel shipments by domestic mills, the USX executive forecast 65 million tons for next year. This would be down from 68 million tons looked for this year and 73 million tons shipped in 1985.

"Almost all of steel's major markets will show a decline in 1987," he noted. He cited the major appliance industry as "one significant exception." Continued high housing starts and favorable consumer confidence levels should fuel another strong performance in 1987 by the appliance industry next year, he added.

Mr. Mulloney noted that domestic steel consumption will continue to be depressed by the "very slow growth in GNP and the overall weakness of the manufacturing sector."

He turned to capital goods markets—the primary consumer of steel—to illustrate the steel industry's import problems.

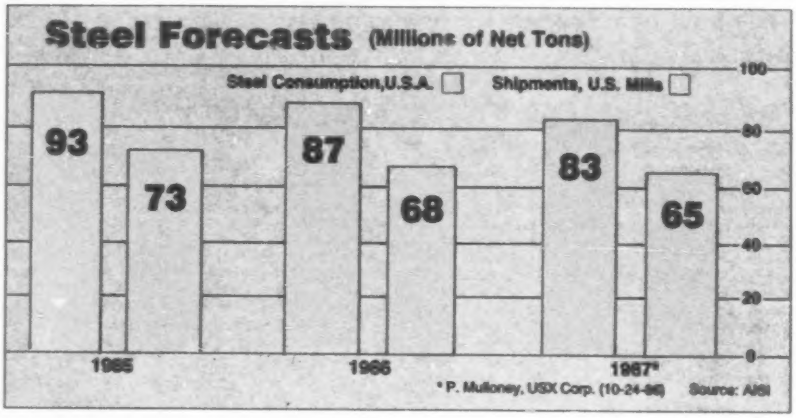
"The capital goods market," he said, "which as recently as 1981 took almost 80 pct of the steel consumed in the United States, will take only a little over 70 pct of a much smaller total in 1987."

He quickly honed in on imports for the explanation for that market weakening.

"One of the most dramatic shifts in our merchandise trade balance," he noted, " has been in the capital goods area. In 1981, the United States had a positive balance of trade in capital goods of $45 billion. In 1985, the U.S. had a positive balance of only $9 billion—a negative swing of $36 billion."

The swing in the trade balance, he noted, "is the single biggest reason for the decline of steel consumption in this (capital goods) sector."

(Cont. on p. 47.)



Steel Forecasts (Millions of Net Tons)

* P. Mulloney, USX Corp. (10-24-86) Source: AISI

Within the overall import context, the USX executive noted that, "The biggest single factor in the decline in U.S. steel consumption... is the dramatic shift in the indirect balance of trade in steel. By indirect steel trade I mean steel that enters or leaves the country in the form of manufactured products."

As late as 1981, he pointed out, the U.S. had a "significant surplus" in indirect steel trade. However, by 1985, the U.S. had a 7.5 million ton deficit. Further, he estimated that the 1986 deficit will be more than 8 million tons.

Demand is There

Still, Mr. Mulloney sees, in the magnitude of indirect steel imports, a clear sign of the underlying strength of steel demand in this country. He said there is a widespread misconception concerning the level of steel consumption in the U.S.

"It is widely believed," he said, "that steel consumption in the U.S. has dropped drastically in the decade of the 1980s. And we are told this is a natural and irreversible condition. I suggest what we have seen is **not** natural and may be reversible."

Based on Mr. Mulloney's estimate of indirect steel trade deficits of over 8 million tons, he noted, "This means that our 1987 forecast of 83 million tons of steel consumption would be well over 90 million if one could return to the indirect trade volumes of 1981 and before.

"This tells us that actual per capita steel consumption in the U.S. has not dropped nearly to the depths we are told—but, much of the steel being consumed by the economy is being imported in the form of automobiles, machinery and other steel-intensive products.

"The erosion of our manufacturing base is our problem."

This erosion, noted the steel executive, is not the natural result of a maturing economy. "Instead," he said, "it has been caused by the unnatural strength of the dollar and weakness of other major currencies, and often by predatory practices of our trading partners."

Mr. Mulloney does not see any imminent relief in the case of the manufacturing erosion problem. He sees dollar depreciation as too little and world steel capacity as too much. Cures here will take time.

In the 'dollar' matter, he sees foreign manufacturers staging a long, hard fight to hold onto their U.S. markets, even at the cost of lower profits.

"Further depreciation of the dollar against the yen and the mark," he said, "will be necessary so as to make it prohibitively expensive to maintain market share in the United States."

Too, he noted, the dollar has depreciated 'only' against certain currencies. "The currencies of Canada, Korea, Taiwan and Brazil—all major exporters to the U.S.—have shown no, or virtually no, appreciation vis-a-vis the dollar."

World steel over-capacity, he said, will possibly take even longer to correct than the dollar.

"Steel suffers from massive over-capacity in the world—about 200 million extra tons."

He cited efforts in the European Community and Japan to curtail capacity. But he also noted that, "As capacity is reduced in the developed world, capacity continues to be added in the newly industrialized countries."

The U.S., he added, must also continue to shed capacity.

"The effect of the President's steel program is to cede between 20 and 25 pct of our markets to imports—that, along with the damage done to our customer base, means capacity must be reduced."

Progress Noted

Amid all the steel industry's problems, Mr. Mulloney did see real progress being made. A confirmation of this is seen in data from the American Iron and Steel Institute that shows U.S. mills have reduced the man-hours required per ton of output from 10.1 in 1982 to 6.9 last year.

Also, he said, there is evidence that domestic mills can now produce steel at less cost per ton than their leading trade partners. The U.S. cost is estimated to be $475. Cost of the foreign competitors—after absorption of their entry costs to U.S. markets: Japan $533, France $510, West Germany $486, U.K. $437.

Those figures, compiled by the brokerage firm Paine Webber, said Mr. Mulloney, were checked out as 'on target' by his own company.

His concluding point was that U.S. manufacturing, including steel mills, are making progress. But full payoff results may yet be some time away because of the magnitude of the problems and the length of time they have been around. ☐

PRICE & PRODUCTION DATA

(Effective October 13, 1986)

Steel production by districts, thousands of tons (000 omitted)

	Last Week	Two Weeks Ago	Month Ago	Year Ago
Northeast Coast	129	130	145	176
Pittsburgh	178	156	165	161
Youngstown	113	100	106	90
Lake Erie	105	103	104	139
Detroit	141	142	132	149
Chicago	305	329	334	488
Midwest	152	150	118	153
Southern	135	133	139	194
Western	41	40	40	86
U.S. Production	1,299	1,283	1,283	1,636

Source: American Iron & Steel Institute

Lake Superior Ore Prices

51.50% Fe Natural delivered lower Lake ports unless otherwise stated. Rail transportation, handling and unloading may be charged to buyer. Coarse ore 80¢ premium.

Pellets (per iron unit natural)	gross ton 58.0*
Pellets (per iron unit natural)	gross ton 59.4**
Pellets (per iron unit natural)	gross ton 72.5-86.9***
Mesabi, regular unscreened	gross ton 32.53
Mesabi, non-bessemer	gross ton 30.03-31.53

*58.0¢—Mineral Services, Inc. as of 8/13/85. **59.4¢—Inland Steel Mining, 1/1/85 and Pickands Mather 8/1/85, delivered hold of vessel upper Lake ports. ***72.5¢—U.S. Steel as of 8/16/85; 86.9¢—Oglebay Norton 3/25/82, Hanna Mining and Cleveland-Cliffs, 2/26/82.

**Effective 8/1/83

STEEL PRODUCTION, COMPOSITE PRICES

(Effective October 13, 1986)

U.S. Steel Production	Last Week	Two Weeks Ago	To Date 1986	To Date 1985
Net tons, in thousands	1,299	1,283	64,528	68,303
Capability Utilization Rate	53.7	53.1	64.6	65.6

Composite Prices	This Week	Week Ago	Month Ago	Year Ago
Finished Steel Base* (¢/lb.—eff. 8/31/86)	24.951	24.951	24.951	27.582
Pig Iron** (Net ton=2000 lbs.)	$213.00	$213.00	$213.00	$213.00
Scrap No. 1 hvy.*** (Gross ton=2240 lbs.)	$ 73.17	$ 73.17	$ 74.50	$ 71.50
No. 2 bundles	$ 50.50	$ 50.50	$ 52.17	$ 52.50

Scrap Comparison (Gross Ton)

No. 1 steel, Pittsburgh	$ 76.50	$ 76.50	$ 76.50	$ 73.50
No. 1 steel, Philadelphia	71.50	71.50	73.50	68.50
No. 1 steel, Chicago	71.50	71.50	73.50	72.50
No. 1 bundles, Detroit	72.50	72.50	72.50	66.50
Low Phos., Youngstown	72.50	72.50	74.50	69.50
No. 1 mach'y cast., Pgh	74.50	74.50	74.50	71.50
No. 1 mach'y cast., Phila	93.50	93.50	93.50	91.50
No. 1 mach'y cast., Chi	101.50	101.50	103.50	99.50

*Finished Steel Composite: Weighted index of steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.
**Pig Iron Composite: Based on average prices for basic and foundry pig iron at representative producing points within the U.S.
***Steel Scrap Composite: Average of No. 1 hvy. melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

NONFERROUS PRICES

(Effective October 13, 1986) Prices obtained in trade based on representative tonnages per gross ton delivered to consumer unless otherwise stated.

Primary Metal Prices

(cents per lb.)	current price	last price	date of change
Aluminum (LME)	52.80	55.39	10/13/86
Copper (C)	62.00	62.50	10/10/86
Lead	25.50	24.50	10/10/86
Magnesium Ingot	153.00	148.00	12/9/85
Nickel (LME)	167.00	162.00	10/13/86
Zinc	47.00	44.50	10/6/86

ALUMINUM: Avg. for last week & previous week. COPPER (C)=cathode. LEAD: common grade. MAGNESIUM: 99.8% pig delivered. NICKEL: Avg. for last week & previous week. ZINC: high grade.

Antimony, American Laredo, Texas	$2.00
Beryllium-aluminum 5% Be, per lb. contained Be	$248.00
Beryllium-copper, per lb. cont. Be	$152.00
Beryllium 97% powder 200	$196.00
Cadmium, ton lots	$1.00
Calcium, ton lots, crown	$3.92
Chromium, 99.5% electro	$4.62
Cobalt, 99%, cathode	$11.70
Gold, per troy oz.	$432.85
Indium, per troy oz.	$2.65
Iridium, per troy oz.	$430.00
Magnesium sticks, 10,000 lbs.	$2.02
Mercury, per 76-lb., f.o.b. N.Y.	$175.00-200.00
Molybdenum, lb. tech. moly oxides, 20 lb. MO can	$3.30
Palladium, per troy oz.	$141.00
Platinum, per troy oz.	$590.00
Rhodium, per troy oz.	$1,275.00
Silver ingots, per troy oz.	$5.66
Titanium sponge, melt grade	$3.40-3.55
Tungsten powder, hyd red	$9.50-9.85
Vanadium	$6.00
Zirconium sponge	$12.00-17.00

(Per lb. unless otherwise noted)

Straits Tin Price

(U.S. cents per lb. EX-SMELTER, based on daily market in Kuala Lumpur in Malaysian dollars per kilo.)

October 6—N.A.
October 7—N.A.
October 8—N.A.
October 9—N.A.
October 10—N.A.

Scrap Prices
Brass Mill Scrap

(Cents per lb.; over 20,000 lbs. add 1¢ per lb.)

	Solids	**Turnings**
Copper	56	51
Yellow brass	50	49½
Red brass	51	47
Comm. bronze	52½	47½
Mang. bronze	41½	40½
Free cutting rod ends	49	48

Custom Smelters Scrap

(Cents per lb., carload lots, del. refinery)

No. 1 copper wire	53
No. 2 copper wire	44
Light copper	36

Ingot Makers Scrap

(Cents per lb., carload lots, del. refinery)

No. 1 copper wire	49
No. 2 copper wire	40
Light copper	32
No. 1 composition	45
No. 1 comp. turnings	44
Hvy. yellow brass solids	30
Hvy. yellow brass turnings	25
Radiators	34

Aluminum

New mixed clips	35	— 36
Old sheet	33	— 34
Old cast	33	— 34
Clean dry borings	34	— 35

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Aluminum

Segregated clippings	28	— 29
Mixed L.C. clips	26	— 27
Old sheets and cast	23	— 24
Borings and turnings	19	— 20
Duraluminum clippings	24	— 25

Copper and Brass

No. 1 copper wire	45	— 47
No. 2 copper wire	36	— 37
Light copper	31	— 33
Radiators	26	— 27
No. 1 composition	36	— 37
No. 1 composition turnings	34	— 35
Cocks and faucets	27	— 28
Clea[illegible]eavy yellow brass	25	— 26
Brass pipe	27	— 28
New soft brass clippings	37	— 39

Lead

Heavy soft lead	5	— 7
Whole batteries	1	— 3
Type metal	15	— 17
Electrotype	13	— 14

Nickel

Nickel solids	105	—115
Nickel rod ends	105	—115
Nickel sheets, clips	105	—115
Nickel turnings	25	— 35

Zinc

New zinc clippings	16	— 17
Old diecast zinc	12	— 13

EFFECTIVE OCTOBER 13, 1986

(Effective October 13, 1986) Prices obtained in trade based on representative tonnages per gross ton delivered to consumer unless otherwise stated. Prices are the opinions of Iron Age editors and correspondents, based on contacts with dealers, brokers, generators and users in the industry on the effective date listed above.

Ferrous Scrap Prices

Pittsburgh

No. 1 hvy. melting	$ 76.00 to	$ 77.00
No. 2 hvy. melting	66.00 to	67.00
No. 1 dealer bundles	93.00 to	94.00
No. 1 factory bundles (auto)	97.00 to	98.00
No. 2 bundles	45.00 to	46.00
No. 1 busheling	89.00 to	90.00
Machine shop turnings	8.00 to	9.00
Shoveling turnings	43.00 to	44.00
Cast iron borings	42.00 to	43.00
Low phos. punchings plate	104.00 to	105.00
Heavy turnings	66.00 to	67.00
No. 1 RR hvy. melting	86.00 to	87.00
Rails, 2 ft and under	97.00 to	98.00
Scrap rails, random lgth	83.00 to	84.00
RR specialties	96.00 to	97.00
No. 1 machinery cast	74.00 to	75.00
Cupola cast	67.00 to	68.00
Heavy breakable cast	30.00 to	31.00
Stainless		
18-8 bundles and solids	485.00 to	495.00
18-8 turnings	385.00 to	395.00

Chicago

No. 1 hvy. melting	$ 71.00 to	$ 72.00
No. 2 hvy. melting	66.00 to	67.00
No. 1 dealer bundles	86.00 to	87.00
No. 1 factory bundles (auto)	86.00 to	87.00
No. 2 dealer bundles	55.00 to	56.00
No. 1 busheling	82.00 to	83.00
Shredder scrap	79.00 to	80.00
Machine shop turnings	24.00 to	25.00
Mixed borings and turnings	16.00 to	17.00
Shoveling turnings	25.00 to	26.00
Cast iron borings	39.00 to	40.00
Low phos. forge crop	92.00 to	93.00
Low phos. punchings plate 1/4 in. and heavier	109.00 to	110.00
Low phos. 2 ft and under	104.00 to	105.00
No. 1 RR hvy. melting	74.00 to	75.00
Scrap rails random lgth	79.00 to	80.00
Reroller rails	100.00 to	101.00
Rails, 2 ft and under	94.00 to	95.00
RR couplers and knuckles	79.00 to	80.00
RR car axles	104.00 to	105.00
No. 1 machinery cast	101.00 to	102.00
Cupola cast	89.00 to	90.00
Stove plate	97.00 to	98.00
Steel car wheels	85.00 to	86.00
Stainless		
18-8 bundles and solids	460.00 to	470.00
18-8 turnings	360.00 to	370.00
430 bundles and solids	125.00 to	135.00
430 turnings	85.00 to	95.00

Philadelphia

No. 1 hvy. melting	$ 70.00 to	$ 73.00
No. 2 hvy. melting	62.00 to	65.00
No. 1 dealer bundles	82.00 to	85.00
No. 2 dealer bundles	49.00 to	52.00
No. 1 busheling	81.00 to	84.00
Shredder scrap	82.00 to	85.00
Machine shop turnings	24.00 to	27.00
Mixed borings and turnings	24.00 to	27.00
Shoveling turnings	37.00 to	40.00
Low phos. 5 ft and under	77.00 to	80.00
Low phos. 2 ft punchings	91.00 to	94.00
Electric furnace bundles	89.00 to	92.00
RR specialties	77.00 to	80.00
Rails, 2 ft and under	94.00 to	97.00
Cupola cast	82.00 to	85.00
Heavy breakable cast	52.00 to	55.00
No. 1 machinery cast	92.00 to	95.00

Detroit

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 51.00 to	$ 52.00
No. 2 hvy. melting	50.00 to	51.00
No. 1 dealer bundles	72.00 to	73.00
No. 2 bundles	35.00 to	36.00
No. 1 busheling	70.00 to	71.00
Drop forge flashings	41.00 to	42.00
Machine shop turnings	24.00 to	25.00
Mixed borings and turnings	6.00 to	7.00
Shoveling turnings	24.00 to	25.00
Cast iron borings	22.00 to	23.00
Heavy breakable cast	32.00 to	33.00
Mixed cupola cast	47.00 to	48.00
Automobile cast	71.00 to	72.00
Stainless		
18-8 bundles and solids	450.00 to	460.00
18-8 turnings	310.00 to	320.00
430 bundles and solids	115.00 to	125.00

Youngstown

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 55.00 to	$ 56.00
No. 2 hvy. melting	53.00 to	54.00
No. 1 dealer bundles	73.00 to	74.00
No. 2 dealer bundles	31.00 to	32.00
Machine shop turnings	19.00 to	20.00
Shoveling turnings	19.00 to	20.00
Low phos. plate	72.00 to	73.00
Electric furnace bundles	61.00 to	62.00
Galvanized bundles	58.00 to	59.00

Cleveland

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 54.00 to	$ 55.00
No. 2 hvy. melting	52.00 to	53.00
No. 1 dealer bundles	78.00 to	79.00
No. 1 factory bundles	78.00 to	79.00
No. 2 bundles	29.00 to	30.00
No. 1 busheling	68.00 to	69.00
Machine shop turnings	19.00 to	20.00
Shoveling turnings	19.00 to	20.00
Cast iron borings	20.00 to	21.00
Cut structural & plates, 5 ft and under	69.00 to	70.00
Cut structural & plates, 2 ft and under	90.00 to	91.00
Low phos. punchings plate	90.00 to	91.00
Foundry steel, 2 ft & under	53.00 to	54.00
No. 1 RR hvy. melting	60.00 to	61.00
Rails, 2 ft and under	89.00 to	90.00
Rails, 18 in. and under	91.00 to	92.00
No. 1 machinery cast	80.00 to	81.00
Mixed cast	47.00 to	48.00
Stainless		
18-8 bundles	450.00 to	460.00
18-8 turnings	315.00 to	325.00
430 bundles	120.00 to	130.00

Buffalo

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 53.00 to	$ 54.00
No. 2 hvy. melting	43.00 to	44.00
No. 1 busheling	71.00 to	72.00
No. 1 dealer bundles	71.00 to	72.00
No. 2 bundles	32.00 to	33.00
Machine shop turnings	13.00 to	14.00
Mixed borings and turnings	13.00 to	14.00
Shoveling turnings	19.00 to	20.00
Cast iron borings	27.00 to	28.00
Low phos. plate	78.00 to	79.00
Structural and plate, 2 ft and under	79.00 to	80.00
Rails, 2 ft and under	79.00 to	80.00
Scrap rails, random lgth	61.00 to	62.00
No. 1 machinery cast	74.00 to	75.00
No. 1 cupola cast	71.00 to	72.00

St. Louis

No. 1 hvy. melting	$ 68.00 to	$ 69.00
No. 2 hvy. melting	56.00 to	57.00
No. 1 busheling	78.00 to	79.00
No. 1 dealer bundles	81.00 to	82.00
No. 2 bundles	54.00 to	55.00
Machine shop turnings	15.00 to	16.00
Shoveling turnings	19.00 to	20.00
Cast iron borings	26.00 to	27.00
No. 1 RR hvy. melting	76.00 to	77.00
Rails, random length	72.00 to	73.00
Rails, 5 ft and under	85.00 to	86.00
RR specialties	77.00 to	78.00
Cupola cast	66.00 to	67.00
Heavy breakable cast	40.00 to	41.00
Stove plate	85.00 to	86.00
Steel car wheels	85.00 to	86.00
Rerolling rails	99.00 to	100.00
Unstripped motor blocks	49.00 to	50.00

Birmingham

No. 1 hvy. melting	$ 70.00 to	$ 71.00
No. 2 hvy. melting	66.00 to	67.00
No. 1 dealer bundles	70.00 to	71.00
No. 2 bundles	46.00 to	47.00
No. 1 busheling	70.00 to	71.00
Shredder scrap	88.00 to	89.00
Machine shop turnings	23.00 to	24.00
Shoveling turnings	36.00 to	37.00
Cast iron borings	36.00 to	37.00
Electric furnace bundles	67.00 to	68.00
Elec. furnace, 3 ft & under	70.00 to	71.00
Structural and plate, 2 ft	89.00 to	90.00
Structural and plate, 4 ft	83.00 to	84.00
No. 1 RR hvy. melting	83.00 to	84.00
Scrap rails, random lgth	73.00 to	74.00
Rails, 2 ft and under	90.00 to	91.00
Angles and splice bars	83.00 to	84.00
No. 1 cupola cast	82.00 to	83.00
Unstripped motor blocks	72.00 to	73.00

Cincinnati

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 54.00 to	$ 55.00
No. 2 hvy. melting	49.00 to	50.00
No. 1 dealer bundles	74.00 to	75.00
No. 2 bundles	32.00 to	33.00
Machine shop turnings	9.00 to	10.00
Shoveling turnings	12.00 to	13.00
Cast iron borings	19.00 to	20.00
Low phos. 18 in. and under	77.00 to	78.00
Rails, random length	59.00 to	60.00
Rails, 2 ft and under	75.00 to	76.00
No. 1 cupola cast	65.00 to	66.00
Heavy breakable cast	25.00 to	26.00
Drop broken cast	67.00 to	68.00

New York

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 38.00 to	$ 40.00
No. 2 hvy. melting	31.00 to	32.00
No. 2 dealer bundles	20.00 to	22.00
Mixed borings and turnings	10.00 to	11.00
Machine shop turnings	4.00 to	6.00
Shoveling turnings	10.00 to	12.00
Clean cast. chem. borings	35.00 to	36.00
No. 1 machinery cast	79.00 to	80.00
Mixed yard cast	50.00 to	51.00
Heavy breakable cast	10.00 to	12.00
Stainless		
18-8 prepared solids	400.00 to	420.00
18-8 turnings	300.00 to	320.00
430 prepared solids	90.00 to	100.00
430 solids	75.00 to	85.00

Boston

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 49.00 to	$ 51.00
No. 2 hvy. melting	39.00 to	41.00
No. 1 dealer bundles	50.00 to	52.00
No. 2 bundles	32.00 to	34.00
No. 1 busheling	56.00 to	58.00
Shredder scrap	59.00 to	61.00
Machine shop turnings	12.00 to	14.00
Shoveling turnings	18.00 to	20.00
No. 1 machinery cast	72.00 to	77.00
Mixed cupola cast	44.00 to	46.00
Heavy breakable cast	8.00 to	10.00

San Francisco

No. 1 hvy. melting	$ 40.00 to	$ 42.00
No. 2 hvy. melting	34.00 to	36.00
No. 1 dealer bundles	31.00 to	33.00
No. 2 dealer bundles	20.00 to	21.00
Machine shop turnings	8.00 to	9.00
Cast iron borings	8.00 to	9.00
No. 1 cupola cast	80.00 to	82.00

Los Angeles

No. 1 hvy. melting	$ 34.00 to	$ 36.00
No. 2 hvy. melting	28.00 to	30.00
No. 1 dealer bundles	26.00 to	28.00
No. 2 dealer bundles	16.00 to	18.00
Machine shop turnings	9.00 to	10.00
Shoveling turnings	10.00 to	11.00
Cast iron borings	8.00 to	9.00
Elec. furnace, 1 ft and under (foundry)	67.00 to	69.00
No. 1 cupola cast	72.00 to	74.00

Seattle

No. 1 hvy. melting	$ 60.00 to	$ 62.00
No. 2 hvy. melting	51.00 to	53.00
No. 2 bundles	35.00 to	37.00
No. 1 cupola cast	89.00 to	90.00
Mixed yard cast	80.00 to	82.00

Hamilton, Ont.

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 74.00
No. 2 hvy. melting, cut 2 ft and under	66.00
No. 1 dealer bundles	82.00
No. 2 bundles	58.00
Mixed steel scrap	53.00
Bush. new fact. prep'd	77.00
Bush. new fact. unprep'd	60.00
Machine shop turnings	30.00
Short steel turnings	30.00
Mixed borings and turning	19.00
Cast scrap	97.00

Houston

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 62.00 to	$ 63.00
No. 2 hvy. melting	52.00 to	53.00
No. 2 bundles	33.00 to	34.00
Machine shop turnings	13.00 to	14.00
Crushed turnings	24.00 to	25.00
Shredder scrap	70.00 to	71.00
Cut structural plate, 2 ft and under	88.00 to	89.00
Cut structural plate, 5 ft and under	70.00 to	71.00
Unstripped motor blocks	54.00 to	55.00
Cupola cast	81.00 to	82.00

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AGAIN, ORDERS TAKE IT ON THE CHIN

August was another trip to nowhere for durable goods orders.

Actually, it was worse than nowhere. Orders, at $102.9 billion, were down 3.1 pct below the July level.

With two-thirds of the year gone, it seems clear that 1986 will be a down year for orders flowing to makers of durable goods.

In the opening month this year, durables orders ran $6 billion higher than in August. And through the first eight months this year, compared to the same time span last year, total manufacturing industry orders were down fractionally.

Factory operating rates and output levels have been running too low for too long to expect any strong pickup in durables orders between August and December.

A number of orders analysts say that imports, more than any other single factor, are keeping a lid on the flow of orders to U.S. plants.

In 1984, the U.S. trade deficit in manufactured goods totaled $79 billion; in 1985, $102 billion. Through the first seven months this year, this trade deficit was running at an annual rate of $126 billion.

Other analysts note that the new tax bill, which is slanted against capital-intensive industries, is another dark cloud over durables orders for the balance of this year. They say the new bill needs some "getting used to."

More fundamental than all these factors, of course, is the strength in the U.S. economy itself. In the second quarter, the economy ran at a 0.6 pct annual growth rate.

That fact, plus the widely forecast growth rate of 2.2 pct for next year, doesn't point to good news for orders for some time.

Billions of Dollars, Seasonally adjusted Monthly Total, unless otherwise noted Source: U.S. Dept of Commerce		Latest Month or Qtr.	Previous Month or Qtr.	Same Period Year Ago
CAPITAL EXPENDITURES (Annual Rates)				
U.S. Industry, Total	4th Q*	$384.0	$380.5	$397.9
Manufacturing, Total	4th Q*	147.6	142.7	158.3
Manufacturing, Durable Goods	4th Q*	70.3	66.3	75.5
Mining Industry	4th Q*	10.2	10.8	15.3
KEY INDICATORS, Durable Goods Manufacturing				
New Orders	Aug.	102.9	106.2	107.7
Shipments	Aug.	104.0	105.0	105.3
Inventories	Aug.	186.6	186.9	192.0
Unfilled Orders	Aug.	354.0	355.1	353.5
NEW ORDERS, METALWORKING				
Capital Goods Producers, Nondefense Industries	Aug.	26.3	27.4	27.6
Capital Goods Producers Defense Industries	Aug.	7.5	10.2	10.3
Primary Metals, Total	Aug.	10.2	9.1	11.0
Steel (SIC 331)	Aug.	4.4	3.7	4.8
Iron & Steel Castings (SIC 332)	Aug.	1.2	1.1	1.3
Nonferrous Metals	Aug.	4.6	4.3	4.9
Nonelectrical Mach.-Equip. Industries, Total	Aug.	16.7	17.2	17.8
Engines & Turbines	Aug.	0.9	1.0	1.3
Farm Mach.& Equipment (Shipments)	Aug.	0.8	0.7	0.9
Construction, Mining & Mat. Hdlg. Equip	Aug.	2.5	2.6	2.9
General Industrial Machinery	Aug.	1.3	1.5	1.3
Metalworking Machinery	Aug.	0.7	0.8	0.7
Machine Tools, Total ($Mill.)**	Aug.	154.3	170.0	184.5
Machine Tools, Metalcutting**	Aug.	114.8	128.8	130.8
Machine Tools, Metalforming**	Aug.	39.5	41.2	53.7
Electrical Mach. & Equip. Industries, Total	Aug.	15.9	17.0	14.7
Elec. Transmission & Ind. Equip.	Aug.	2.1	2.2	2.2
Household Appliances	Aug.	1.5	1.6	1.3
Communication Equipment	Aug.	5.3	6.0	5.1
Transportation Equipment,Total	Aug.	25.8	28.4	29.9
Motor Vehicles & Parts (Shipments)	Aug.	17.0	16.9	17.1
Aircraft, Missiles & Parts	Aug.	7.6	9.2	11.3
Shipbuilding & Military Tanks	Aug.	0.6	1.5	0.4
Fabricated Metal Products, Total	Aug.	13.8	14.0	14.6
Instruments, Total	Aug.	4.7	4.8	4.8

*Est. – Commerce Dept; **Source: NMTBA

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IRON AGE
NOVEMBER 21, 1986

MANUFACTURING MANAGEMENT

Computer Shock

The problems it causes
The remedies at hand

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MAY87
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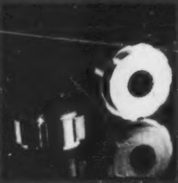
BETHESDA MD 20814

Why the Interest In Powder Metal Forgings



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MANUFACTURING MANAGEMENT

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islative program for consideration when the new Congress meets in January.

In releasing the report, Rep. Doug Bernard (D-Ga.) noted that it was the first Congressional evaluation of Mr. Reagan's VRA program, and added:

"The committee finds that without global country and product coverage, it is unlikely that the President's and Congress' targets for limiting steel imports will be achieved. The VRA process is not sufficiently comprehensive—only legislation mandating the targets will succeed in achieving the desired goals."

The Democrats recommended:

—Congress should pass legislation limiting total steel imports of all grades and products to 20.2 pct of the U.S. market, and the U.S. Trade Representative should start negotiations with countries not covered by the VRAs: Canada, Sweden, Argentina, and Taiwan.

—The Administration should limit steel imports from countries that won't agree to a VRA, and the Administration should also strictly enforce the provisions of the VRAs that prohibit countries from sending only high value products to the U.S.

—Congress and the Administration should take tough measures to prevent circumvention of the program through diversion to non-quota countries where steel products destined for the U.S. market are finished.

—Members of Congress should try to get accurate data on the volume of "indirect" imports of products containing steel such as cars, farm machinery, and construction machinery.

—The legislators should put a 100 pct "Buy America" requirement on all government procurement of steel mill products. And it should also pass a bill extending Mr. Reagan's steel program for five years from Jan. 1, 1987—but the bill should also require steel firms to keep using their resources to modernize steel plants.

—And, Congress should pass bills to give the steel industry compensation for past injuries resulting from unfair trade practices, and to give the U.S. Customs Service enough money to prevent illegal steel shipments from entering the country.

To back up those recommendations, Rep. Bernard concluded, "Although steel imports have been cut back from their all-time high levels as a result of the President's program, the targets of the program have not been met. Steel imports in June 1986 still captured 22.7 pct of the U.S. steel market (compared to the Administration's VRA goal of 18.5 pct). The reasons for this missed opportunity to reclaim jobs and local business for our industries is largely that the program, as implemented, has not been comprehensive. Major importers such as Canada, Sweden, Taiwan, and Argentina are not covered."

R&D funding for materials shows 4.6 pct increase for FY87

At first glance the $1.15 billion the government is allocating for R&D in materials science and engineering looks pretty good.

What makes it look that way, however, is the $119 million earmarked toward the new national aerospace plane. Many other programs have suffered severe cutbacks.

According to the Federation of Materials Societies in Washington, the largest recipient of materials R&D funds, the Department of Energy, has had its budget cut from $609 million in FY86 to $479 million in the current year. The Department of Defense, thanks mainly to the national aerospace plane, moves up from $164 to $291 million.

Also moving up are the National Science Foundation and NASA, with the NSF increasing from $137 to $148 million. NASA's increase is $170 million in FY87 from $121 million the previous fiscal year.

Materials R&D

(In Millions of Dollars)

	FY85	FY86	FY87
Department of Energy	647	609	479
Nat'l Science Foundation	135	138	148
Nat'l Bureau of Standards	23	25	36
Bureau of Mines	33	40	25
Interagency Acid Deposition Program	1	1	1
Department of Defense	155	164	291
NASA	107	121	170
Total	1,100	1,098	1,150

Source: Federation of Materials Societies

The National Bureau of Standards also moves up, from $25 to $35 million, while the Bureau of Mines goes down from $40 to $25 million. The funding for the interagency acid deposition program remains the same, $1.075 million.

Hard-hit DOE programs include solar energy and advanced nuclear reactor research. The above programs were cut 45 and 61 pct, respectively. Funding for nuclear space and defense power systems is being increased from $20 to $71 million.

Federal court upholds 'right-to-know' rules on hazardous materials

In a precedent-setting ruling affecting manufacturers, a Federal appeals court has upheld a state law with "right-to-know" rules for workers dealing with hazardous substances.

Last month, a Pennsylvania state law requiring right-to-know rules was largely upheld by the Third U.S. Circuit of Appeals in Philadelphia. Business groups had argued that the state law was preempted by weaker Federal laws and rulings that require the U.S. Labor Department Occupational Safety and Health Administration (OSHA) to administer national right-to-know standards.

A Federal district court in Pennsylvania first held that much of the state law was preempted by

Computer Shock:

The Problems It Causes... The Remedies at Hand

Compared to their foreign competitors, many U.S. manufacturers are slow to adopt new technology into their factories.

BY ROBERT E. HARVEY

Though urged to take injections of advanced technology to remain competitive, U.S. manufacturers often faint at the sight of the needle.

Computer Shock Syndrome, as this allergic reaction to doses of computer-integrated manufacturing (CIM) might be called, looms as a major reason U.S. manufacturing facilities are falling before the Japanese juggernaut.

Even when fighting for survival against overseas competition, some manufacturing firms suffering from computer shock have been known to balk at taking lifesaving doses of computer-aided automation.

Particularly widespread in midsize and smaller companies, computer shock, nevertheless can turn up in the largest facilities. In this condition, firms, even when confronted by cutthroat competition, freeze at the prospect of computerized manufacturing.

The condition is diagnosed in a report on advanced manufacturing technology use prepared by the Technology Management Center, Philadelphia, for the U.S. Commerce Department: "Though new technologies are readily available, companies are avoiding their use primarily because they do not understand them, find them too confusing, and are intimidated by them."

The report noted that a company's initial explanations why it was not using new technologies usually were: "The machines are two expensive; we can't obtain a return of investment over two years, or my batch runs are too small to justify the equipment."

These responses revealed a lack of understanding of and confusion about the nature and value of advanced computer technologies, noted the report.

It is ironic that the country most responsible for developing high technology has so much trouble adopting that technology.

Technology has been stymied by a variety of obstacles. Overcoming these is prerequisite to a resurgence of U.S. manufacturing. The widening gap between U.S. and Japanese manufacturing competence is due not to inferior technology but, in a large part, to the inability of U.S. companies to effectively implement available technologies and strategies.

One of these obstacles is the widening distance between those who choose the technology and those who use it.

Resistance To Change

In larger firms, the profusion of staff specialists and the build up of multi-layered middle management has moved implementation responsibility from users to the specialists. The result: hostility by factory workers to staff and specialists, and resistance to change. Technological change imposed from above is simply viewed as an irritant and has little chance of success. In Japan, the workers spearhead the adoption of advanced technology, using staff and specialists when needed.

"What has happened over the past several years, as we have moved to more sophisticated technology, we have gone from single items to systems," says Charles Downey, vice president, marketing, Industrial Automation Systems Group, Gould Inc., Andover, Mass. "What that has done is push the purchasing decision level up higher in the company.

"In the past, if you wanted a controller or software for the tool room, and you were the manager of tool control, you could go out and get what you needed. Now the tool room guy is not even part of the decision-making process."

As the focus shifts from individual equipment to systems (and even the most mundane piece of equipment is expected to tie into something) the manager in the tool room and, in many cases, even the plant manager are left out of buying decisions.

When equipment is purchased as part of a system, those responsible for purchases increasingly have lofty titles. Now, the executive vice president of operations, sitting in a corporate office, chooses what systems some distant plant will install. Financial and information officers as well are becoming heavily involved in automation decisions.

A brand new clique of executives with little factory knowledge are seizing responsibility for increasing amounts of factory equipment purchases.

'Top management doesn't understand what the technology is all about...'

Due to this shift in purchasing responsibility, several things are happening. For one, friction between plant engineers and upper management is growing.

"Both middle and upper management are the major contributors to the problem. But if I had to pick one culprit, it would be upper management," said William J. Finch, president, Finch Robotics, Montgomeryville, Pa., a manufacturing consulting firm. "Upper management throws the ball to and intimidates middle managers, who are afraid to fail. So, they fall back on what they know best, their experience."

But, doing things the old way often means rejecting the new.

The idea of using computers to control processes on a manufacturing floor is still not readily accepted, says an IBM spokesperson.

Computers are still foreign to people at all levels of employment. Many suffer fear of the computer terminal. Unfamiliarity and inexperience with computers leads many managers to be skeptical and fearful of taking risks with CIM.

Some believe that automation will not succeed until the current generation of line management — and CEOs as well — retire.

"Top management today basically is not manufacturing oriented," observed Mr. Finch. "It still thinks that replacement of direct labor is the key element in justifying technology.

"And they don't understand the factory floor. They, from what I see, seem to have lost sight of their goal — what they are in business for."

Paradoxically, many executives see technology as the solution to their productivity problems, but technology, at least initially, is usually not the answer.

"I yell loudest to get automation into companies," continued Mr. Finch, "but automation comes only after companies get back to the basics.

"Many companies today are operating out of control, and automation is not going to help them. These factories don't know how to schedule their parts, maintain their inventories, or maintain communications between workers and supervisors.

"Top management doesn't understand what the technology is all about, middle management is scared of it, and the engineers who know about it are too politically oriented to open their mouths."

In a Bind

Smaller companies, in particular, are in a bind. Their managers, intimidated by technology, are be-

Authors Robert H. Hayes and Steven C. Wheelwright, in their book, *Restoring Our Competitive Edge*, suggest that when management's knowledge of a manufacturing technology is low, the risk executives perceive in changing it is relatively high.

But as they gain more knowledge about the technology, surprisingly, their perception of the risks associated with changing it may actually increase. They see more problems with the technology, for example, while still uncomfortable about overcoming them. As a result, they often become even more conservative when called upon to make manufacturing technology-related decisions.

It is only when knowledge reaches a certain point that the perceived risk goes down. Similarly, the perceived opportunities from process change vary in a similar curve. At first opportunities seem good, then not so good, and finally, good again. Managers, knowing little about technology, are frequently persuaded to see in them tremendous promise and opportunity. Later, they are likely to experience great disappointment when computerized systems fail to meet expectations.

Managers, however, who finally get a solid understanding of their process technologies will see the value and potential of making technological changes and, most importantly, understand what is involved in making such a change.

ing told by major customers to automate or face a loss of business. Yet, they lack the technical staffs to get automation efforts pointed in the right direction.

And, they are leery about relying heavily on suppliers and consultants. "We have been looking at who could help the small manufacturer," explained Jacques Koppel, director, Technology Management Center and chief architect of the report on international competitiveness. "There really was not an effective resource. Small companies don't like consultants; they cost too much. Vendors and equipment manufacturers are not a lot of help either, for they are trying to sell a product and really don't understand how manufacturing works. Most of the sales people are sales people and not engineers."

As a result of ignorance, confusion and fear, not to mention a fixation on short term gain, spending on technology has become increasingly conservative. With some justification the current decline in capital spending can be traced to confusion by the new decision-makers over the complexities and risks of automation. Lacking knowledge of and proximity to operations, decisions now tend to be made by the numbers. But numbers can paint a distorted picture. The inaccuracies of current cost accounting and cost justification practices are the subject of many a seminar these days.

Working with inadequate information and cowed by the unfamiliar risks that accompany process change, the new decision-makers are putting automation decisions on hold.

More education, like this college class, is needed to overcome computer shock.

"People tend to manage by head count or other easy ways to measure the business," says Mr. Downey. "But when you talk about automation, the benefits of the automation may not be as easily quantifiable as decisions in the past. These people don't fully understand the benefits of automation at the factory level.

"I find it very difficult right now to sell a particular isolated product. It has to be able to integrate with a higher level system, so more evaluation, more justification, is needed. The purchasing decision just gets pushed up higher and higher until it stalls."

Basing modernization decisions on numbers rather than a knowledge of manufacturing can lead to trouble. In the later years of the Vietnam conflict, the purpose of the war was submerged beneath a numbers game. As the demands for body counts grew, lieutenants and captains began keeping two sets of books, one for actual and another for reported body counts. Twenty ducks made the body count list of one platoon.

In the factory, as in Southeast Asia, playing solely by the numbers tends to hide the overall purpose of an organization behind a drive to achieve certain short-term figures. What plant manager does not keep two sets of books?

"I have been in 100 plants where a plant manager still builds from his gut," notes Mr. Downey. "He gets all kinds of computer printouts and marketing forecasts and then he issues on a piece of paper his build schedule. He keeps two sets of books. He keeps a manual system while the computer system is running in parallel."

Executives with more understanding and support of factory floor operations are sorely needed if automation is to take hold.

"I have a theory," says Jerome J. Peloquin, president, Performance Control Corp., West Chester, Pa., an automation training company. "And it is that all line managers everywhere are involved in a conspiracy to prevent their bosses from knowing how bad things really are."

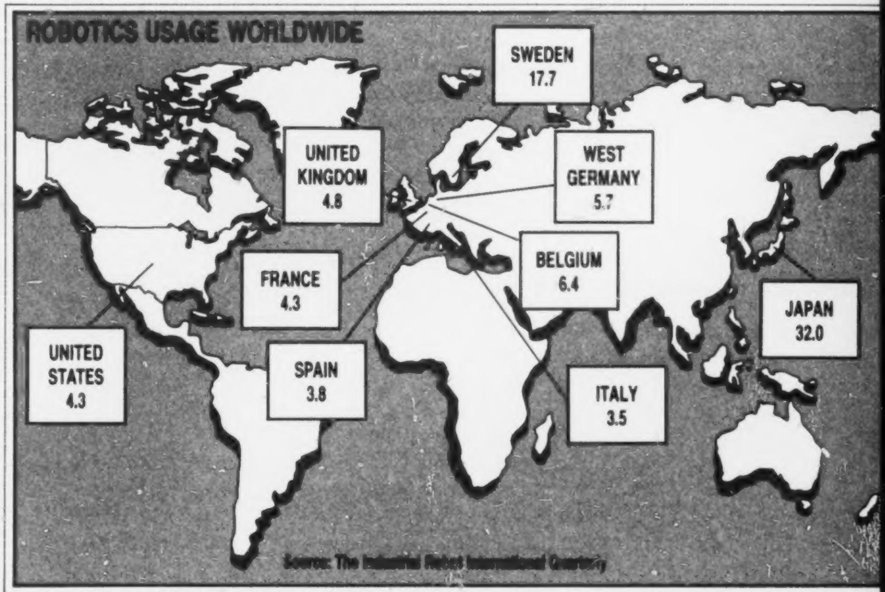
Numbers Are Not Everything

Justification obstacles would be less formidable if those making the decisions were more comfortable with their knowledge about the factory.

Managers talk about the need to base decision-making on objective evidence rather than hunches by a line supervisor. But evidence is mounting that given the same numbers, executives are more likely to take a risk if they are comfortably knowledgeable about that risk. Managers, uneasy about manufacturing, are less likely to take risks regardless of the figures.

No business is without risk, wrote Robert H. Hayes and Steven C. Wheelwright, in their book, *Restoring Our Competitive Edge*. Usually it is not a question of whether to take a risk or not but substituting one risk for another. Not taking an immediate risk, for example, could mean bigger problems later on.

"This distinction needs to be stressed because of a manager's reaction to a particular type of risk often appears to depend more on his or her familiarity with that risk than on its actual magnitude," say Messrs. Hayes and Wheelwright. "The same technological risks that appear so ominous and uncontrollable to a marketing or financial manager might not be worrisome at all to the technical person.... The point is that the manager who has considerable experience with certain risks tends to have a much more realistic reaction to them."



Source: The Industrial Robot International Quarterly

Comparison of Robotics Usage Worldwide: *The figures indicate the number of robots used per 10,000 workers. In comparison of robots/workers, the U.S. ranks sixth.*

If top management has little first-hand knowledge about a firm's process technology and how it has evolved, it may be less willing to accept the risks associated with changing that technology, say the authors.

But if no knowledge is bad, a little knowledge (see box p. 26) is worse. A major reason companies have cut back on computer purchases apparently is due to growing confusion about their use. It is not that executives know less about computers then they did five years ago. At present, they can at least talk a good game. A little wiser now, they are able to see the hazards more clearly, but are not yet knowledgable enough to glimpse the benefits. While intimate knowledge of computers and manufacturing is not essential for management, increased understanding does make risk-taking appear more palatable.

Though various obstacles make it difficult for technology to get in the door of many plants, once in the door is no guarantee that it will be implemented successfully.

(Cont. on p. 28.)

Education and Training

If education is critical to understanding and acceptance of computerization by executives, it is equally important for acceptance by line managers and workers. But education is often ignored.

"Though much forethought, planning, and cost justification normally accompany the installation of complex industrial automation systems, the job of training people to use them is all too frequently an afterthought," explains Jerry Guarino, Education Marketing Manager, Gould Industrial Automation Systems, Andover, Mass. "The results are sadly predictable. Without recognition of the human element in the industrial automation equation, the newest, most innovative technologies and production strategies will never realize their anticipated potential."

Introducing new equipment creates so much anxiety that the success of new technology often depends more on how it is accepted than how advanced the technology is.

Frequently, automation is introduced abruptly. People are not ready for it and reject it.

Often, says Mr. Finch of Finch Robotics, technology introduction is best left to an outsider—a consultant or a vendor—because someone has to take the brunt of the criticism when things go wrong (and they will).

Many companies need an outsider to go in and change the way they have been doing things for 30 years, he adds.

For an automation implant to be accepted, companies need a detailed plan. They need to get back to the basics and discover who they are and what they really want to do. And they have to prepare the company to reduce the chance of rejection.

Even when the need is recognized, providing adequate training is difficult. Because of its high cost, some equipment vendors have little incentive to provide top-notch training. The buyer, for his part, often doesn't know what good training is. Training often ends up with a expert lecturing a group of workers, who benefit little from the talk.

"An insidious situation now exists," notes Mr. Peloquin. "You now have computerized equipment whose price/performance rations are falling at amazing rates. To be competitive, a vendor can no longer afford the same level of support. The trend has got to be away from customer service and toward customer self-sufficiency. Problem is few companies know how to do it."

In the past, preparation and training often have been secondary to the technology itself. A number of troubled companies in recent years have tried to solve a problem by throwing technology at it. The results of this strategy have not been pretty.

International Data Systems, for example, estimates that approximately $10 billion has been spent thus far on material requirements planning (MRP) systems for computerized inventory control. Yet only 25 pct of these systems have achieved installation objectives.

No matter how much the preplanning, the focus is usually on technology, not people.

One company, H.R. Krueger Machine Tool, Inc., Farmington, Mich., decided that CIM was needed to remain competitive. The system was implemented, but according to Bruce L. Moore, president, the company found that high technology did not work on its own.

"It requires the added ingredient of committed people excited about the opportunities, not only now, but in the future," he explains. "We have gradually realized that because of this, in-house training has to be a permanent, ongoing and necessary part of our lives."

As companies adopt increasing amounts of technology, training efforts will grow in importance. Unable to run to a vendor for every training need, various forms of in-house training, such as computer-based training, will flourish. To ease the training burden, firms like General Motors and Ford have come out with machinery training specifications, says Mr. Peloquin.

"These say," he explains, "that if you are going to sell me a machine, the machine should have certain technical capabilities, but so should the training. The objective is to set measurable objectives for training and develop training standards."

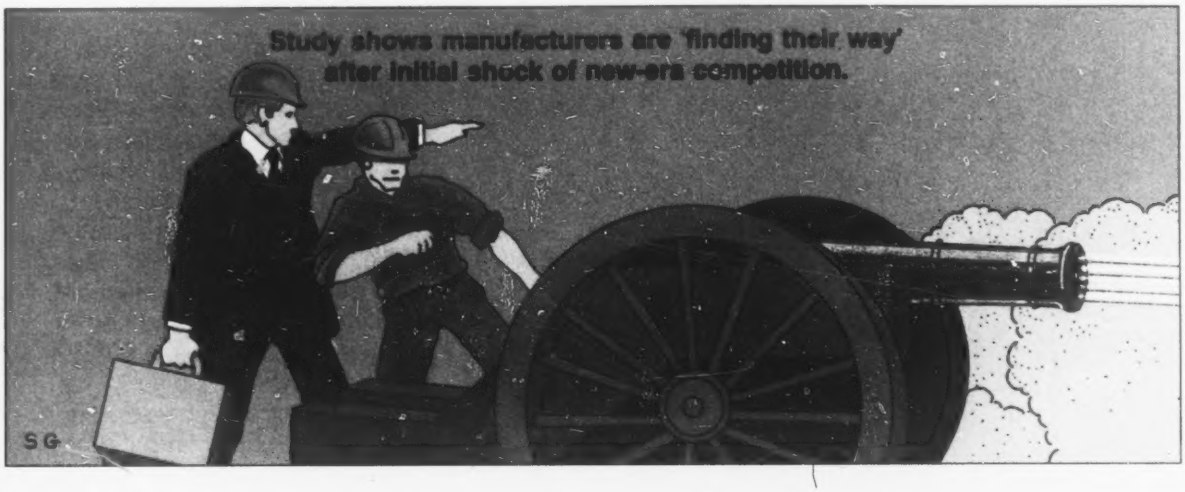
Besides looking at improving training, companies are looking at other ways of removing the obstacles blocking technological implementation. One is that decision-makers know too little about manufacturing. This is changing. Executives with operations backgrounds are in demand.

At Ex-Cell-O Corp.'s Cone Drive Div., computers and workers have been successfully integrated.

According to *Management Practice Quarterly* from Management Practice Consulting Partners, N.Y., "44 pct of the newly appointed CEOs in 1985 had technical and operations backgrounds, compared to less than 30 pct in 1981. Last year, only 12 pct of newly appointed CEOs had a financial background.

"This change seems to indicate that U.S. business is responding to some of the bitter lessons of global competition, where pragmatic nuts-and-bolts skills may be more critical than abstract managerial skills." □

U.S. MANUFACTURERS SET TO COUNTERATTACK



Study shows manufacturers are 'finding their way' after initial shock of new-era competition.

BY JOHN D. BAXTER

North American manufacturers, caught up in a new era of intensified competition, may be finally getting down to business.

In a five-year series of survey studies, Boston University's Manufacturing Roundtable found that action programs of manufacturers in the last two years were more closely aligned with targeted priorities and concerns than in the previous three years.

"We interpret this finding," said the researchers, "as an indication that manufacturers' earlier confusion about how to meet competitive challenges is being replaced with a clearer understanding of what must be done and why."

And "what must be done" is to deliver to the marketplace better quality products – and at lower prices.

Analysts found support for this view in another finding of the over-the-years surveys. "North American manufacturers," they noted, "continue to emphasize quality, product performance and delivery in competition with others. However, the ability to offer lower prices than the competition is becoming increasingly important. This trend represents the most clear-cut change in priorities over the five years in which the surveys have been administered."

The new clarity of thinking, and toughness, of North American manufacturers comes to a sharp focus on what the effort is all about. Increasingly, top management is moving manufacturing operations to the front in corporate strategy and planning and setting up lines of communications to implement the shift.

A Competitive Weapon

Said Jeffrey G. Miller, director of the Roundtable, "We would like to believe that the perceived need to develop manufacturing as a competitive weapon is creating the need for managers and workers to communicate better."

The survey findings, and interpretation, highlights what may be the ultimate goal in all the ferment now going on in North American manufacturing – "to develop manufacturing as a competitive weapon."

As noted in just these three key findings of the Roundtable surveys, it appears manufacturing in North American companies is moving towards the Japanese model. In corresponding survey studies run in Japan, the Roundtable found that Japanese manufacturers rate product price as No. 1 in competitive importance. That element was still fourth-ranked by North American manufacturers in the 1986 study. But, notably, as the Roundtable studies show, product price is fast moving up on their priority list.

Too, there is no question but that the Japanese have used manufacturing as a "competitive weapon" in world trade wars – and to great effect.

There is special importance to manufacturers in the findings of the Roundtable studies. First, they have been run now over a period of five years. The series has the needed continuity to spot trends.

Secondly, corresponding surveys of manufacturers have been run in Japan and leading European countries. (The 1986 results of the foreign surveys are not yet known at this time). This scope of the studies allows comparison of North American manufacturers with their world competitors.

Third, these surveys are important because they reflect the plans and actions of 'leader' or 'pace-setter' manufacturers in North America. How they think, and what they do, can serve as as industrial 'model.'

The 1986 survey received responses from senior managers in 182 business units. Noted Mr. Miller, "These companies, on average, were considerably more profitable and faster growing than the Fortune 500. The average business unit in the sample has also been investing in plants and R&D to a considerably greater extent than the average large American firm.

"Our conclusions about manufacturing in general are based on the presumption that these firms represent the opinion leaders that will set the pace for other manufacturing firms in the future."

Notably, more than 60 pct of the surveyed business units were in basic goods, machinery and other industrial goods lines.

The Roundtable studies, run by faculty members in the Business School at Boston University, and the Manufacturing Engineering Department, are sponsored by a number of leading manufacturing companies. These companies include General Electric Co., Whirlpool Corp., The Stanley Works and Digital Equipment Co.

Manufacturers, Top Concerns per Selected N. American Manufacturers

Concerns	1986 Scores	Ranking by Trends in Scores (1986 vs 1983)
1. Producing to Quality Standards	3.59	1. High Overhead costs
1. High Overhead Costs	3.57	2. Introducing New Products
3. Introducing New Products	3.47	**3. Lead Times
4. Forecasting (Poor Sales Forecasts)	3.21	4. Forecasting (Poor Sales Forecasts)
5. Yields,Rejects	3.12	5. Yields,Rejects
*6. Implementing New Technologies	3.12	6. Materials Costs
7. Materials Costs	3.11	7. Producing to Quality Standards
8. Lead Times	3.04	8. High Inventories
9. Indirect Labor Productivity	3.03	9. Indirect Labor Productivity
10. High Inventories	3.01	

* Question not included in surveys prior to 1896

** Trend-ranked from 1984

Scoring Values: Senior manufacturing manager's ranking by degree of current concerns on scale from 1 (no concern) to 5 (critical concern).

Manufacturer's Competitive Priorities per Selected N. American Manufacturers

Priority	1986 Scores	Ranking by Trends in Scores (1986 vs 1983)
1. Consistent Quality	4.54	1. Low Price
2. High Performance Products	4.08	2. Design Flexibility
3. Dependable Delivery	4.06	3. Consistent Quality
4. Low Price	3.81	4. Dependable Delivery
5. Fast Delivery	3.65	5. Fast Delivery
6. Design Flexibility	3.57	6. After Sales Service
7. After Sales Service	3.52	7. High Performance Products
8. Rapid Volume Changes	3.23	8. Rapid Volume Changes

Scoring Values: Senior manufacturing manager's ranking by degree of importance on scale from 1 (no effect) to 5 (critical).

A Hard Look

The 1986 study, as did the four preceding ones, looked hard at manufacturing's basic mandate—to cost effectively produce a product that will be a winner in a competitive marketplace. In that context, the 1986 study addressed three basic questions (although researchers asked many more):

—What are the major concerns of manufacturing managers, and how are they changing over time?

—What are the dominant competitive priorities currently being emphasized in manufacturing?

—What action programs are evolving to strengthen and improve manufacturing effectiveness?

Among manufacturing managers, the report authors, Mr. Miller and Aleda V. Roth, noted "an increasing concern with communications issues."

They said, "Particular problems show up with strategies and goal articulation, communicating manufacturers' needs to top management and communicating effectively with other functional areas."

Importantly, managers have noted, communications must flow down to worker ranks. The need is clear. "More than ever before," it was noted in the report, "workers and line supervisors are beginning to understand strategic directions, and are being asked to play larger roles."

An important finding for producers of industrial capital goods is that "the focus on new technology has taken a back burner to the first priority of getting the entire plant operation under control."

Manufacturers, it was found, are emphasizing a variety of fundamental approaches, especially those which promise to improve product quality. Manufacturers, apparently, want to tighten all their plant operations before they move on to new equipment.

Another key finding of the 1986 survey—and a rising trend since earlier surveys—is that "the Just-In-Time (JIT) manufacturing philosophy is becoming firmly entrenched."

Mr. Miller said that JIT "challenges many assumptions about 'best practice' in manufacturing management and represents a significant departure for the firms that have adopted it."

He also noted that the companies with JIT are also the ones that most likely will be found developing significant programs to improve quality, reduce setups, broaden jobs and introduce computer-aided manufacturing.

Wide-Ranging

In order to identify the leading concerns of manufacturers, Roundtable researchers presented senior manufacturing managers with a list of 36 issues related to production planning and control, process technology, workforce activities, quality, costs, information systems and various other items. The managers were asked to indicate the degree of their current concern on a scale from 1 (no concern) to 5 (critical concern). The leading concerns, ranked in order and also showing in terms of trend over recent years, are listed in a box (see p. 33).

In sum, states the report, "The predominant issues facing management today are producing to quality standards, high and rising overhead costs and timely introduction of new products."

Manufacturer's Action Programs

Activities Rated as Significantly More Importantin 1986 than in 1985

1. **Workers taking on broader jobs**
2. **Workers taking on more responsibility**
3. **Zero Defects programs**
4. **Statistical Process Control**
5. **Lead time reduction**
6. **Improving maintenance practices**
7. **Changing Manufacturing organization**
8. **Developing new processes for old products**
9. **Computer-Aided Manufacturing development**

A notable shift in concern of top manufacturing managers has occurred in the cost area. Traditionally, direct labor costs have been high on the list of concerns. But now, it is overhead costs that get top billing. Those costs were ranked No.2 in concerns last year and moved to No.1 in 1986.

"Concern with high overhead costs," noted Mr. Miller, "is no doubt a reflection of increasing price consciousness, as well as concern with a problem area where manufacturers are less certain about solutions."

In the rankings of concerns over the past four years, 'producing to quality standards' has held on to first place. "But," noted the report, "that concern seems to have been released from the intensive care category over the past several years."

Mr. Miller feels that the hard work put into quality improvement programs in recent years has borne fruit. Quality is still a critical concern, but it is viewed as manageable with real progress having been made.

Competitive Priorities

A second line of questions by Roundtable members was designed to pinpoint the competitive priorities of manufacturing managers. In this case, the managers were asked to indicate, on a scale from 1 (no effect) to 5 (very critical), the degree of importance to the business unit of each of 8 'abilities' needed to compete successfully over the next five years. These abilities were then ranked in order of importance and noted for trend over the past four years. (see box for listings).

Not surprisingly, the two top-rated abilities noted in this year's survey were ability to achieve consistent product quality and ability to produce high-performance products. Below these top issues, the survey respondents indicated a need to improve delivery capability, lower product prices and bring more flexibility to product design.

In terms of a rising trend in need capabilities, 'low product prices' ranked No.1. Again, that is the horse in the race that is moving up fast.

Also, as Mr. Miller suggested, more U.S. top managers are now viewing 'manufacturing as a competitive weapon.' The cornerstone of such a strategy is the manufacturing capability to shake up a market in terms of a maximized price/quality combination.

Lower on the Roundtable strategic priority list this year were such concerns as ability to make faster deliveries, ability to make rapid design changes, introduction of more new products and efforts to improve the quality of after-sales service.

Clearly, the competitive priorities point to the objective of top-quality products at the lowest possible price tag—that is, maximum customer value.

Competitive priorities of manufacturers do not have the same rankings for all industries. For example, in business units in machinery industries, after-sales service ranked fifth in 1986. For all business units surveyed, this ability ranked seventh. But, except for a few such exceptions, the rankings of priorities held up well across the full spectrum of manufacturing industries.

Key Action Programs

One of the key findings in the 1986 survey was, as noted, close alignment of concerns of manufacturers and the action programs they use, or plan to use, to deal with those concerns. This alignment was much closer than in surveys taken in previous years.

In the survey, action programs of manufacturers referred to programs currently underway, or where the firm planned to carry out a program over the next two years. Responses had a scale value from 1 (no emphasis) to 5 (critical emphasis).

Product quality was clearly in the lead in action programs in the 1986 survey. The first three programs in ranking were Statistical Process Control, Zero Defects and Vendor Quality. Programs to introduce more new products came in fourth place.

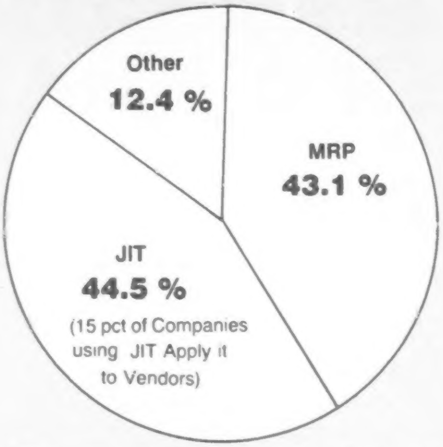
Next ranked were three programs centered in better control and integration of shop operations. By titles, these included Production Control Systems, Statistical Product Control and Manufacturing Systems Integration.

Motivation programs and lead times, and programs to reduce lead times were next.

Summing up on manufacturing action programs, Mr. Miller said, " 'Back-to-basics' production management is emerging on several fronts. We observe primary emphasis being placed on total quality control."

He noted also that "an important change" seems to be occurring in the way senior manufacturing managers are approaching production planning and inventory control. During the past decade," he said, "materials requirement planning (MRP) had been the predominant way for manufacturers to improve their planning and control efforts. The survey suggests that MRP is giving way to... Just-in-Time (JIT)." (See diagram, p.39.)

Production Planning and Inventory Control System
Pct of Manufacturers Who Plan to Use



MRP = Materials Requirement Planning

JIT = Just-in-Time

A Clear Trend

The over-the-years trend in manufacturers' action programs is also revealing. Activities that were more important in 1986 than in 1985 show the growing importance of worker participation programs. (See box, p.36). The big gainer this year was programs designed around workers taking on broader jobs.

A point made by Mr. Miller is that business units using JIT tend to also emphasize use of such techniques zero defects, statistical process control (SPC), and vendor quality programs.

The study found little differences across industry boundaries in use of the various key action plans. "Managers in the basic industry sector," said Mr. Miller, "rate SPC programs higher in importance than their counterparts in the consumer goods area. Similarly, they place a higher priority on statistical product control than do those in the industrial goods manufacturing sector.

In a conclusion to the study, Mr. Miller stated, "In the first years in which this survey was administered (1982-83), there was considerable variance between what the respondents said were their top priorities and concerns, and their action programs. The 1985 and 1986 surveys reveal much more consistency in terms of the overall concordance between priorities, concerns and programs.

"We interpret these differences as heartening evidence that more manufacturers are finding their way after the initial shock of facing up to international competition in the early 1980s.

"We interpret the relative consistency of action plans in recent years to be a consequence of the eventual sorting out of various alternative programs for improvement that followed the discovery that 'something had to be done'."

In short, in shop terms, the 1986 Roundtable findings suggest that U.S. manufacturers finally 'have their act together.' □

PRICE & PRODUCTION DATA

(Effective November 3,1986)

Steel production by districts, thousands of tons (000 omitted)

	Last Week	Two Weeks Ago	Month Ago	Year Ago
Northeast Coast	141	142	130	176
Pittsburgh	177	186	156	155
Youngstown	112	114	100	94
Lake Erie	109	106	103	146
Detroit	148	134	142	150
Chicago	341	340	329	439
Midwest	165	159	150	153
Southern	147	146	133	188
Western	43	42	40	82
U.S. Production	1,383	1,369	1,283	1,583

Source: American Iron & Steel Institute

Lake Superior Ore Prices

51.50% Fe Natural delivered lower Lake ports unless otherwise stated. Rail transportation, handling and unloading may be charged to buyer. Coarse ore 80¢ premium

Pellets (per iron unit natural)	gross-ton 58.0*
Pellets (per iron unit natural)	gross-ton 59.4**
Pellets (per iron unit natural)	gross-ton 72.5-86.9***
Mesabi, regular-unscreened	gross-ton $32.53
Mesabi, non-bessemer	gross-ton $30.03-31.53

*58.0¢–Mineral Services, 8/13/85. **59.4¢–Inland Steel Mining, 1/1/85 and Pickands Mather, 8/1/85, delivered hold of vessel, upper Lake ports. ***72.5¢–U.S.Steel, 8/16/85. 86.9¢–Oglebay Norton 3/25/82; Hanna Mining and Cleveland-Cliffs 2/26/82.

STEEL PRODUCTION, COMPOSITE PRICES

(Effective November 3,1986)

U.S. Steel Production	Last Week	Two Weeks Ago	To Date 1986	To Date 1985
Net tons, in thousands	1,383	1,369	68,568	73,142
Capability Utilization Rate	57.2	56.6	64.0	65.4

Composite Prices	This Week	Week Ago	Month Ago	Year Ago
Finished Steel Base* (¢/lb.—eff. 8/31/86)	24.951	24.951	24.951	27.582
Pig Iron** (Net ton= 2000 lbs.)	$213.00	$213.00	$213.00	$213.00
Scrap No. 1 hvy.*** (Gross ton=2240 lbs.)	$ 74.17	$ 73.17	$ 73.17	$ 68.83
No. 2 bundles	$ 50.50	$ 50.50	$ 50.50	$ 50.17

Scrap Comparison (Gross Ton)

No. 1 steel, Pittsburgh	$ 78.50	$ 76.50	$ 76.50	$ 69.50
No. 1 steel, Philadelphia	71.50	71.50	71.50	67.50
No. 1 steel, Chicago	72.50	71.50	71.50	69.50
No. 1 bundles, Detroit	75.50	72.50	72.50	56.50
Low Phos., Youngstown	75.50	72.50	72.50	65.50
No. 1 mach'y cast., Pgh	74.50	74.50	74.50	68.50
No. 1 mach'y cast., Phila	93.50	93.50	93.50	91.50
No. 1 mach'y cast., Chi	101.50	101.50	101.50	97.50

*Finished Steel Composite: Weighted index of steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

**Pig Iron Composite: Based on average prices for basic and foundry pig iron at representative producing points within the U.S.

***Steel Scrap Composite: Average of No. 1 hvy. melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

NONFERROUS PRICES

(Effective November 3,1986) Prices obtained in trade based on representative tonnages per gross ton delivered to consumer unless otherwise stated.

Primary Metal Prices

(cents per lb.)	current price	last price	date of change
Aluminum (LME)	50.75	51.16	11/3/86
Copper (C)	62.00	63.00	10/31/86
Lead	26.75	25.50	10/31/86
Magnesium Ingot	153.00	148.00	12/9/85
Nickel (LME)	165.00-166.00	165.00	11/3/86
Zinc	47.00	44.50	10/6/86

ALUMINUM: Avg. for last week & previous week. COPPER (C) = cathode. LEAD: common grade. MAGNESIUM: 99.8% pig. delivered. NICKEL: Avg. for last week & previous week. ZINC: high grade.

Antimony, American Laredo, Texas	$2.00
Beryllium-aluminum 5% Be, per lb. contained Be	$248.00
Beryllium-copper, per lb. cont. Be	$152.00
Beryllium 97% powder 200	$196.00
Cadmium, ton lots	$1.00
Calcium, ton lots, crown	$3.92
Chromium, 99.5% electro	$4.62
Cobalt, 99%, cathode	$11.70
Gold per troy oz.	$401.00
Indium, dollars per troy oz.	$2.65
Iridium, dollars per troy oz.	$420.00
Magnesium sticks, 10,000 lbs.	$2.02
Mercury, per 76-lb., f.o.b. N.Y.	$200.00-215.00
Molybdenum, lb. tech. moly oxides, 20 lb. MO can	$3.45
Palladium, per troy oz.	$130.00
Platinum, per troy oz.	$571.00
Rhodium, per troy oz.	$1,170.00
Silver ingots, per troy oz.	$5.64
Titanium sponge, melt grade	$3.40-3.55
Tungsten powder, hyd red.	$9.50-9.85
Vanadium	$6.00
Zirconium sponge	$11.00-17.00

(Per lb. unless otherwise noted)

Straits Tin Price

(U.S. cents per lb. EX-SMELTER, based on daily market in Kuala Lumpur in Malaysian dollars per kilo.)

October 27—N.A.
October 28—N.A.
October 29—N.A.
October 30—N.A.
October 31—N.A.

Scrap Prices
Brass Mill Scrap

(Cents per lb; over 20,000 lbs. add 1¢ per lb)

	Solids	Turnings
Copper	56	51
Yellow brass	50	49½
Red brass	51	47
Comm. bronze	52½	47½
Mang. bronze	41½	40½
Free cutting rod ends	49	48

Custom Smelters Scrap

(Cents per lb., carload lots, del. refinery)

No. 1 copper wire	53
No. 2 copper wire	48
Light copper	41

Ingot Makers Scrap

(Cents per lb., carload lots, del. refinery)

No. 1 copper wire	49
No. 2 copper wire	40
Light copper	32
No. 1 composition	45
No. 1 comp. turnings	44
Hvy. yellow brass solids	30
Hvy. yellow brass turnings	25
Radiators	34

Aluminum

New mixed clips	35	— 36
Old sheet	33	— 34
Old cast	33	— 34
Clean dry borings	34	— 35

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Aluminum

Segregated clippings	28	— 29
Mixed L.C. clips	26	— 27
Old sheets and cast	23	— 24
Borings and turnings	19	— 20
Duraluminum clippings	24	— 25

Copper and Brass

No. 1 copper wire	44	— 47
No. 2 copper wire	35	— 36
Light copper	32	— 33
Radiators	22	— 23
No. 1 composition	36	— 37
No. 1 composition turnings	34	— 35
Cocks and faucets	30	— 31
Clean heavy yellow brass	26	— 28
Brass Pipe	26	— 27
New soft brass clippings	39	— 40

Lead

Heavy soft lead	5	— 7
Whole batteries	1	— 3
Type metal	15	— 17
Electrotype	13	— 14

Nickel

Nickel solids	105	—115
Nickel rod ends	105	—115
Nickel sheets, clips	105	—115
Nickel turnings	25	— 35

Zinc

New zinc clippings	16	— 17
Old diecast zinc	12	— 13

EFFECTIVE NOVEMBER 3, 1986

(Effective November 3, 1986) Prices obtained in trade based on representative tonnages per gross ton delivered to consumer unless otherwise stated. Prices are the opinions of *Iron Age* editors and correspondents, based on contacts with dealers, brokers, generators and users in the industry on the effective date listed above.

Ferrous Scrap Prices

Pittsburgh

No. 1 hvy. melting	$ 78.00 to	$ 79.00
No. 2 hvy. melting	68.00 to	69.00
No. 1 dealer bundles	96.00 to	97.00
No. 1 factory bundles (auto)	98.00 to	99.00
No. 2 bundles	45.00 to	46.00
No. 1 busheling	94.00 to	95.00
Machine shop turnings	8.00 to	9.00
Shoveling turnings	45.00 to	46.00
Cast iron borings	44.00 to	45.00
Low phos. punchings plate	104.00 to	105.00
Heavy turnings	68.00 to	69.00
No. 1 RR hvy. melting	86.00 to	87.00
Rails, 2 ft. and under	94.00 to	95.00
Scrap rails, random lgth	86.00 to	87.00
RR specialties	94.00 to	95.00
No. 1 machinery cast	74.00 to	75.00
Cupola cast	67.00 to	68.00
Heavy breakable cast	30.00 to	31.00
Stainless		
18-8 bundles and solids	485.00 to	495.00
18-8 turnings	385.00 to	395.00

Chicago

No. 1 hvy. melting	$ 72.00 to	$ 73.00
No. 2 hvy. melting	68.00 to	69.00
No. 1 dealer bundles	85.00 to	87.00
No. 1 factory bundles (auto)	86.00 to	87.00
No. 2 dealer bundles	57.00 to	58.00
No. 1 busheling	84.00 to	85.00
Shredder scrap	80.00 to	81.00
Machine shop turnings	22.00 to	23.00
Mixed borings and turnings	14.00 to	15.00
Shoveling turnings	23.00 to	24.00
Cast iron borings	39.00 to	40.00
Low phos. forge crop	93.00 to	94.00
Low phos. punchings plate 1/4 in. and heavier	111.00 to	112.00
Low phos. 2 ft. and under	106.00 to	107.00
No. 1 RR hvy. melting	76.00 to	77.00
Scrap rails random lgth	79.00 to	80.00
Reroller rails	100.00 to	101.00
Rails, 2 ft. and under	94.00 to	95.00
RR couplers and knuckles	79.00 to	80.00
RR car axles	104.00 to	105.00
No. 1 machinery cast	101.00 to	102.00
Cupola cast	89.00 to	90.00
Stove plate	97.00 to	98.00
Steel car wheels	85.00 to	86.00
Stainless		
18-8 bundles and solids	460.00 to	470.00
18-8 turnings	360.00 to	370.00
430 bundles and solids	125.00 to	135.00
430 turnings	85.00 to	95.00

Philadelphia

No. 1 hvy. melting	$ 70.00 to	$ 73.00
No. 2 hvy. melting	62.00 to	65.00
No. 1 dealer bundles	84.00 to	87.00
No. 2 dealer bundles	47.00 to	50.00
No. 1 busheling	84.00 to	87.00
Shredder scrap	82.00 to	85.00
Machine shop turnings	24.00 to	27.00
Mixed borings and turnings	24.00 to	27.00
Shoveling turnings	37.00 to	40.00
Low phos. 5 ft. and under	77.00 to	80.00
Low phos. 2 ft. punchings	91.00 to	94.00
Electric furnace bundles	93.00 to	96.00
RR specialties	77.00 to	80.00
Rails, 2 ft. and under	94.00 to	97.00
Cupola cast	81.00 to	84.00
Heavy breakable cast	52.00 to	55.00
No. 1 machinery cast	92.00 to	95.00

Detroit

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$ 51.00 to	$ 52.00
No. 2 hvy. melting	50.00 to	51.00
No. 1 dealer bundles	75.00 to	76.00
No. 2 bundles	36.00 to	37.00
No. 1 busheling	73.00 to	74.00
Drop forge flashings	41.00 to	42.00
Machine shop turnings	24.00 to	25.00
Mixed borings and turnings	6.00 to	7.00
Shoveling turnings	24.00 to	25.00
Cast iron borings	22.00 to	23.00
Heavy breakable cast	32.00 to	33.00
Mixed cupola cast	47.00 to	48.00
Automobile cast	71.00 to	72.00
Stainless		
18-8 bundles and solids	450.00 to	460.00
18-8 turnings	310.00 to	320.00
430 bundles and solids	115.00 to	125.00

Youngstown

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$ 57.00 to	$ 58.00
No. 2 hvy. melting	55.00 to	56.00
No. 1 dealer bundles	77.00 to	78.00
No. 2 dealer bundles	32.00 to	33.00
Machine shop turnings	17.00 to	18.00
Shoveling turnings	17.00 to	18.00
Low phos. plate	75.00 to	76.00
Electric furnace bundles	64.00 to	65.00
Galvanized bundles	61.00 to	62.00

Cleveland

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$ 56.00 to	$ 57.00
No. 2 hvy. melting	54.00 to	55.00
No. 1 dealer bundles	82.00 to	83.00
No. 1 factory bundles	83.00 to	84.00
No. 2 bundles	30.00 to	31.00
No. 1 busheling	71.00 to	72.00
Machine shop turnings	17.00 to	18.00
Shoveling turnings	17.00 to	18.00
Cast iron borings	20.00 to	21.00
Cut structural & plates 5 ft. and under	72.00 to	73.00
Cut structural & plates, 2 ft. and under	93.00 to	94.00
Low phos. punchings plate	93.00 to	94.00
Foundry steel, 2 ft. & under	55.00 to	56.00
No. 1 RR hvy. melting	63.00 to	64.00
Rails, 2 ft. and under	92.00 to	93.00
Rails, 18 in. and under	94.00 to	95.00
No. 1 machinery cast	83.00 to	84.00
Mixed cast	50.00 to	51.00
Stainless		
18-8 bundles	450.00 to	460.00
18-8 turnings	315.00 to	325.00
430 bundles	120.00 to	130.00

Buffalo

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$ 55.00 to	$ 56.00
No. 2 hvy. melting	45.00 to	46.00
No. 1 busheling	75.00 to	76.00
No. 1 dealer bundles	75.00 to	76.00
No. 2 bundles	32.00 to	33.00
Machine shop turnings	13.00 to	14.00
Mixed boring and turnings	13.00 to	14.00
Shoveling turnings	19.00 to	20.00
Cast iron borings	27.00 to	28.00
Low phos. plate	78.00 to	79.00
Structural and plate 2 ft. and under	80.00 to	81.00
Rails, 2 ft. and under	79.00 to	80.00
Scrap rails, random lgth	61.00 to	62.00
No. 1 machinery cast	75.00 to	76.00
No. 1 cupola cast	71.00 to	72.00

St. Louis

No. 1 hvy. melting	$ 70.00 to	$ 71.00
No. 2 hvy. melting	59.00 to	60.00
No. 1 busheling	80.00 to	81.00
No. 1 dealer bundles	83.00 to	84.00
No. 2 bundles	55.00 to	56.00
Machine shop turnings	15.00 to	16.00
Shoveling turnings	19.00 to	20.00
Cast iron borings	26.00 to	27.00
No. 1 RR hvy. melting	76.00 to	77.00
Rails, random length	72.00 to	73.00
Rails, 5 ft. and under	85.00 to	86.00
RR specialties	77.00 to	78.00
Cupola cast	66.00 to	67.00
Heavy breakable cast	40.00 to	41.00
Stove plate	85.00 to	86.00
Steel car wheels	85.00 to	86.00
Rerolling rails	99.00 to	100.00
Unstripped motor blocks	49.00 to	50.00

Birmingham

No. 1 hvy. melting	$ 73.00 to	$ 74.00
No. 2 hvy. melting	69.00 to	70.00
No. 1 dealer bundles	73.00 to	74.00
No. 2 bundles	49.00 to	50.00
No. 1 busheling	73.00 to	74.00
Shredder scrap	95.00 to	96.00
Machine shop turnings	25.00 to	26.00
Shoveling turnings	36.00 to	37.00
Cast iron borings	36.00 to	37.00
Electric furnace bundles	69.00 to	70.00
Elec. furnace, 3 ft. & under	75.00 to	76.00
Structural and plate, 2 ft.	90.00 to	91.00
Structural and plate, 4 ft.	83.00 to	84.00
No. 1 RR hvy. melting	83.00 to	84.00
Scrap rails, random lgth	73.00 to	74.00
Rails, 2 ft. and under	93.00 to	95.00
Angles and splice bars	83.00 to	84.00
No. 1 cupola cast	82.00 to	83.00
Unstripped motor blocks	74.00 to	75.00

Cincinnati

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$ 54.00 to	$ 55.00
No. 2 hvy. melting	49.00 to	50.00
No. 1 dealer bundles	74.00 to	75.00
No. 2 bundles	32.00 to	33.00
Machine shop turnings	9.00 to	10.00
Shoveling turnings	12.00 to	13.00
Cast iron borings	19.00 to	20.00
Low phos. 18 in. and under	77.00 to	78.00
Rails, random length	59.00 to	60.00
Rails, 2 ft. and under	75.00 to	76.00
No. 1 cupola cast	65.00 to	66.00
Heavy breakable cast	25.00 to	26.00
Drop broken cast	67.00 to	68.00

New York

Brokers buying prices per gross ton on cars.

No. 1 hvy. melting	$ 38.00 to	$ 40.00
No. 2 hvy. melting	31.00 to	32.00
No. 2 dealer bundles	20.00 to	22.00
Mixed borings and turnings	10.00 to	11.00
Machine shop turnings	4.00 to	6.00
Shoveling turnings	10.00 to	12.00
Clean cast. chem. borings	35.00 to	36.00
No. 1 machinery cast	79.00 to	80.00
Mixed yard cast	50.00 to	51.00
Heavy breakable cast	10.00 to	12.00
Stainless		
18-8 prepared solids	380.00 to	400.00
18-8 turnings	280.00 to	320.00
430 prepared solids	90.00 to	100.00
410 solids	75.00 to	85.00

Boston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$ 49.00 to	$ 51.00
No. 2 hvy. melting	39.00 to	41.00
No. 1 dealer bundles	53.00 to	55.00
No. 2 bundles	32.00 to	34.00
No. 1 busheling	56.00 to	58.00
Shredder scrap	59.00 to	61.00
Machine shop turnings	12.00 to	14.00
Shoveling turnings	18.00 to	20.00
No. 1 machinery cast	72.00 to	77.00
Mixed cupola cast	44.00 to	46.00
Heavy breakable cast	8.00 to	10.00

San Francisco

No. 1 hvy. melting	$ 40.00 to	$ 42.00
No. 2 hvy. melting	34.00 to	36.00
No. 1 dealer bundles	31.00 to	33.00
No. 2 dealer bundles	20.00 to	21.00
Machine shop turnings	8.00 to	9.00
Cast iron borings	8.00 to	9.00
No. 1 cupola cast	80.00 to	82.00

Los Angeles

No. 1 hvy. melting	$ 34.00 to	$ 36.00
No. 2 hvy. melting	28.00 to	30.00
No. 1 dealer bundles	26.00 to	28.00
No. 2 dealer bundles	16.00 to	18.00
Machine shop turnings	9.00 to	10.00
Shoveling turnings	10.00 to	11.00
Cast iron borings	8.00 to	9.00
Elec. furnace, 1 ft. and under (foundry)	67.00 to	69.00
No. 1 cupola cast	72.00 to	74.00

Seattle

No. 1 hvy. melting	60.00 to	62.00
No. 2 hvy. melting	51.00 to	53.00
No. 2 bundles	35.00 to	37.00
No. 1 cupola cast	89.00 to	90.00
Mixed yard cast	80.00 to	82.00

Hamilton, Ont.

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 74.00
No. 2 hvy. melting, cut 2 ft. and under	66.00
No. 1 dealer bundles	82.00
No. 2 bundles	58.00
Mixed steel scrap	53.00
Bush. new fact. prep'd	77.00
Bush. new fact. unprp'd	60.00
Machine shop turnings	30.00
Short steel turnings	30.00
Mixed borings and turnings	19.00
Cast scrap	97.00

Houston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$ 62.00 to	$ 63.00
No. 2 hvy. melting	52.00 to	53.00
No. 2 bundles	33.00 to	34.00
Machine shop turnings	13.00 to	14.00
Crushed turnings	23.00 to	24.00
Shredder scrap	71.00 to	72.00
Cut structural plate, 2 ft. and under	88.00 to	89.00
Cut structural plate, 5 ft. and under	70.00 to	71.00
Unstripped motor blocks	54.00 to	55.00
Cupola cast	81.00 to	82.00

TAKE THIS PRICE DATA WITH A GRAIN OF SALT

There wasn't anything scary about producer prices in September. That is, there weren't any signs of a breakout on the upside.

But there were some puzzling aspects to the U.S. Labor Dept.'s report on producer finished goods prices for the month.

First off, prices moved up. They rose by 0.4 pct from August. Still, there is evidence the rise did not signal new underlying inflation pressures.

One reason for this rather sharp turn-up was a 3.7 pct rise in prices of finished energy goods. Energy prices had been falling sharply just about every month. But, in September, reflecting an earlier OPEC agreement to curb production, oil prices rose. It was a quirk; oil prices are already heading down again.

Another development colored prices in September. Note on the table here, the sharp decrease in auto and truck tags from August to September. That may puzzle many, especially those who shopped for cars during the month.

The slide in auto prices shown here was seasonally adjusted to a rise. Prices had been discounted for several months to clear year-end stocks. This meant that September of this year did not carry the usual great bulk of price discounting as in past years. So, after the usual seasonal adjustments were made this year, the effect was to raise prices on autos and trucks in September. Before seasonal adjustment, as shown, these prices were actually down.

So, between unusual actions affecting energy prices, and unusual seasonal factors upsetting auto prices, September was not a month on which to make any definitive price trend judgments.

Latest Month Covered: September 1986

Products	Index Reading For Month (1967 = 100)	Pct Change From Previous Month	Pct Change From Year-Ago Month
Metal Cutting Machine Tools	405.0	+ 0.1	+ 1.7
Metal Forming Machine Tools	441.1	0	+ 1.5
Agricultural Machinery & Equip.	340.1	– 0.1	+ 0.8
Construction Machinery & Equip.	366.9	– 0.1	+ 1.1
Oil and Gas Field Machinery	408.0	– 1.0	– 4.3
Industrial Material Handling Equip.	297.1	+ 0.1	+ 0.7
Pumps, Compressors & Allied Equip.	363.3	+ 0.2	+ 1.9
Mining Machinery & Equipment	382.3	+ 0.4	+ 0.6
Mechanical Power Transmission Equip.	347.9	0	+ 2.4
Automobiles	223.1	– 4.0	+ 6.4
Motor Trucks – Light	294.9	– 3.7	+ 7.8
Motor Trucks – Heavy	335.2	– 3.7	+ 5.8
Railroad Equipment	363.2	– 1.3	– 0.4
Fabricated Metal Structural Products	317.2	0	+ 0.7
Electric Motors	353.5	+ 0.1	+ 0.6
Valves & Fittings (Dec. 1982 = 100)	107.1	+ 0.2	+ 1.6
Ball & Roller Bearings	356.9	0	+ 0.9
Foundry & Forge Shop Products	361.7	– 0.1	– 0.6
Heating Equipment	271.3	+ 0.9	+ 3.7
Plumbing Fixtures & Brass Fittings	324.8	+ 0.7	+ 3.5
Metal Containers	362.5	0	+ 1.3
Internal Combustion Engines	353.8	– 0.1	+ 1.7

Data based on U.S. Labor Dept.'s Producer Price Index

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IRON AGE
DECEMBER 5, 1986

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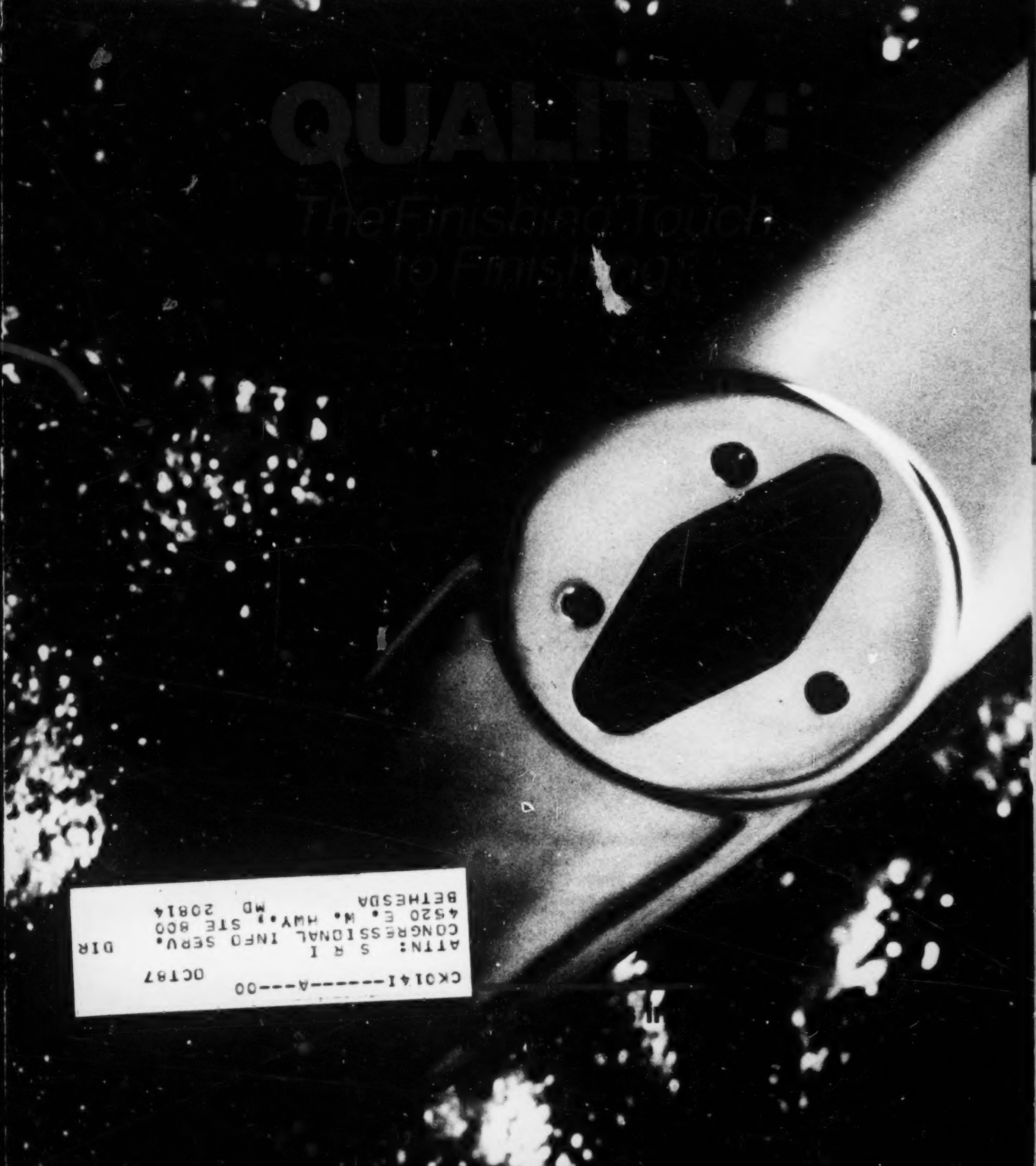

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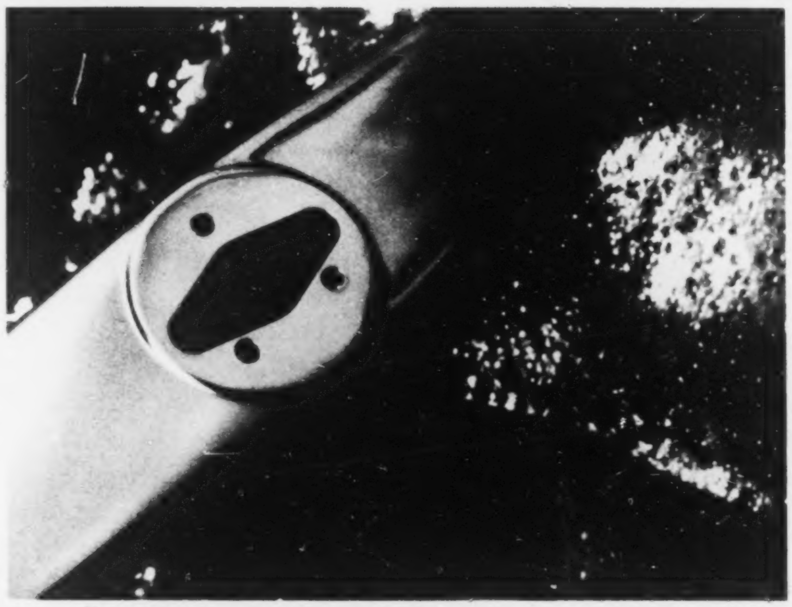

Cover Photo: Courtesy of M&T Chemicals, Inc.

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1987: MATERIAL HANDLING'S YEAR

The material handling system was the place where you could queue up product-in-process. Now products are flowing from operation to operation.

BY ROBERT E. HARVEY

For the Chinese, each year has a special name. This is the Year of the Tiger; next year will be the Year of the Hare. If manufacturers did such things, they likely would designate 1987 as The Year of Material Handling.

Let me explain.

Over the years, as one rising technology after another caught the manufacturer's eye and public spotlight, material handling equipment remained in the background, setting the stage for stars—cutting, bending, fastening equipment and the rest.

But with the recent interest in flexibility, integration, and in just-in-time (JIT) delivery in particular, awareness of material handling is suddenly perking up. Whether this latest interest is sparking short-term excitement or long-term commitment remains to be seem. Some people still need some convincing.

"The people who control the purse strings have not understood the value of material handling in bringing all the parts to the work station together and on time," says Seth R. Schneible, director, marketing services, S.I. Handling Systems Inc., Easton, Pa. "It is seen by them as a necessary evil."

Mr. Schneible believes those who control spending often consider material handling as an afterthought. Appropriations for CNC lathes, the CAD/CAM systems came first. Any leftovers were tossed at the problem of getting products from one place to another.

But for material handling to advance rather than flicker and die, planners must consider material handling earlier than they do.

Automated Guided Vehicles (AGVs) hold a special attraction for companies implementing JIT because of their flexibility.

"Companies are discovering that they can't design the process and then come along and link it with material handling," says Keith Wheeler, vice president, systems engineering, Litton Industrial Automation Systems, Inc. "That is what created those large buffers in the first place that firms are now seeking to reduce.

"We see customers recognizing more and more that material handling design is a key element in their manufacturing strategy. But they need to design material handling in at the beginning, so the system can work as a unit rather than as discrete elements."

Companies that are not looking to improve material handling operations on their own often are being pushed into it by their customers. Companies like GM and Harley-Davidson are demanding that their suppliers move toward JIT and flexible production.

Improved Product Flow

"Companies increasingly are interested in improving product flow," says David W. Clark, vice president, engineering, Jervis B. Webb Co., Farmington Hills, Mich. "Now, as soon as parts arrive at the plant from the outside, they have got to reach the right station in a hurry. The product has got to arrive at the right time to be assembled in the right sequence. Everything has to fall into place, and it takes a material handling system with some computer intelligence behind it to pull this all together."

To make material handling systems more responsive to these new demands, a lot of interest today lies in "adding a higher degree of intelligence to the conveyor system," says Mr. Clark.

"What is happening is that customers are beginning to focus on error margins, safety stock issues. These are what JIT and other strategies specifically seek to address," notes Mr. Wheeler of Litton. "When initiated, they begin to squeeze the operation internally. They begin to reduce that margin of error. The material handling system was the error buffer years ago. It was the place where you could queue up large amounts of product-in-process."

Not any more. Now with the squeeze on inventory, instead of moving from operation to buffer to operation, parts are moving from operation to operation. All of the strategies that we see happening today, continues Mr. Wheeler, are direct attempts to reduce that error margin and reduce inventory to a more manageable and more cost effective level.

This increased emphasis on JIT, on getting material to just the right place in just the right quantities at just at the right time impacts material handling strategies in a variety of ways:

—First, JIT focuses on plant layout improvement. Its goal is to streamline the flow of materials by concentrating production of one product or one product family in one section of the factory (cellular manufacturing).

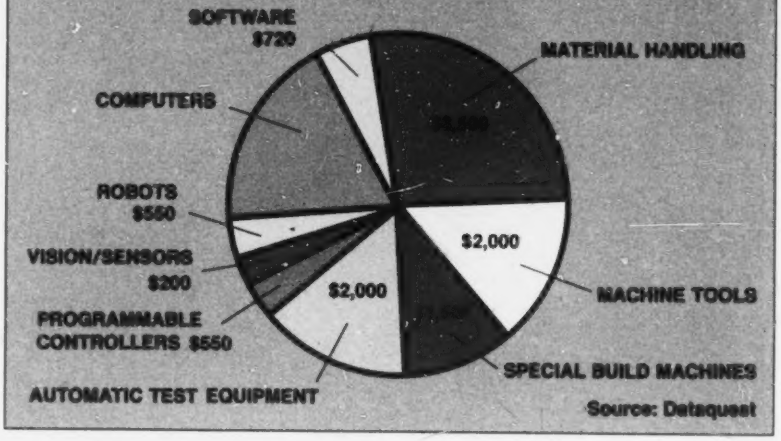
—Second, JIT attacks excessive lot sizes. Its object is to turn stop-and-go production facilities into a flow shop. But for a job shop to become a flow shop, it must reduce lot sizes. The smaller the lot sizes get, the easier it is to match daily production with daily demand. Matching supply with demand, however, requires highly flexible, responsive material handling.

—Third, JIT practices stress-reduced inventory levels. According to JIT doctrine, inventory is waste, a cover-up for poor manufacturing practices. But reducing inventory often means making major changes in handling and storage operations.

Material Handling Is The Biggest Slice of The Manufacturing Automation Pie

United States 1985 Manufacturing Automation Market

(Millions of Dollars)



Source: Dataquest

In particular, JIT aims at improving material flow by reducing material handling and storage operations as much as possible.

Worker Control

Japanese material handling systems are usually of the *pull* rather than the *push* variety. "The Japanese idea is this: don't force work on a worker before he is effectively done with what he is doing," says Mr. Wheeler of Litton. "U.S. companies, at one time users of this system, moved away from it. They tried to increase productivity by using the external environment (regulating the speed of handling systems, for example) to force people to do a specific scope of work within a specific time frame."

U.S. manufacturers are again discovering that manufacturing driven by time standards might be less effective than "a variable solution based on the specific needs of the work and the product. Using this strategy, the Japanese are able to get high quality and flexibility," notes Mr. Wheeler.

New material handling approaches are being developed to address the new handling needs demanded by JIT.

"One that is very popular today is an integrated material management system. It does not have large queues and does not have an in-process build-up of materials, but basically is a request-on-demand system and delivers flexibility throughout the facility," explains Mr. Wheeler. "What you see typically is a materials-management spine down the center of the factory. All the operations are supported by that spine. So material can be moved anywhere in the facility based on the demand of individual workstations."

For all the advantages of JIT, it is not without its dangers. Operating without that safety net of just-in-case inventory demands strict material handling discipline. Firms must be careful not to mount the JIT bandwagon too quickly.

"JIT is growing rapidly in importance," says Ron Ketko, vice president, Cleaver Ketko Gorlitz Papa & Assoc., Birmingham, Mich., a material handling consulting company. "But JIT implementation has to be done very carefully, for every operation is not going to be able to run at 100 pct precision. So, there always has to be, in my opinion, a specific amount of cushion to allow for various hiccups.

"We have seen two schools of thought; one as bad as the other. At one time, companies were so conservative that they maintained one-hour banks of parts between operations and had miles and miles of redundant material handling conveyors. However, now some companies have gone too far the other way."

Back to the Basics

Paralleling this movement toward JIT and increased flexibility is a move back to the basics. Rather than purchasing more capital equipment, a number of firms are trying to make better use of the equipment they already have. Simplification, they are finding, is a prerequisite to automation. And much of that simplification effort is focusing on material handling.

"We encourage people to go to the basics, learn what the problem is and look at the whole gamut of material handling solutions," explains Mr. Clark of Jervis B. Webb. "They shouldn't just opt for fancy systems. We find customers sometimes want to install something much more sophisticated than they really need."

Due to changing manufacturing perceptions, due in part to increased interest in JIT and the desire for increased flexibility, material handling is acquiring new dimensions. It is, for example, being asked to do more.

"A conveyor today can do more than just take items from point A to Point B," says Mr. Clark. "It might tell a workstation or cell what to do with the part it is delivering there, for example. The conveyor, in this case, not only conveys the product but a piece of information right along with it."

Material handling systems are now able to gather, respond to, and pass on information on a variety of subjects such as quality, processing, identification, and measurement to workstations on the line, to plant computers, and to other handling systems.

In a JIT environment their task can be even more demanding. The simplicity of JIT operations and the need to respond immediately to worker demands, rather than a schedule, means that integrating information gathered by a flexible handling system with more-structured production systems, like material requirements planning (MRP) systems, becomes more difficult.

To accommodate its increased work load, controls for material handling systems have improved by leaps and bounds.

Revolutionary Controls

Mr. Schneible offers but one example of how controls are being used. "The handling system first says that is will bring a particular part up to station X. Station X may be a robot, a CNC machine. Upon delivery, the system announces to the station that it is there with the part. The control system at station X then goes to work on the part and announces when processing is finished. Now the master controller gives the handling system directions as to where to take the processed part."

This type of control can be done with a variety of types of hardware. But the hardware that is attracting the most interest is hardware that is flexible enough to be controlled by the worker. Simple systems deliver parts, not on worker demand, but according to a fixed schedule. Power-and-free type equipment is flexible enough for worker control, but automated guided vehicles (AGVs) are more flexible still and are currently receiving a great deal of attention.

AGVs are computer-controlled vehicles which can move throughout the factory, traveling above wires imbedded in the floor. The allure of AGVs, especially for companies implementing JIT, is their extreme flexibility. For example, they can be programmed to pick up material according to a schedule or only when requested to. They can deliver the material just when needed.

"AGVs are promoting a lot of batch assembly," says Mr. Clark. "Instead of car after car on a continuous assembly line in an auto plant, you have one car on an AGV, it goes to a cell where a team of workers performs a variety of operations. When they have completed their operations, and everything is right, they release it to the next station."

"With AGVs, you can control the material handling from the dock to, say, the intermediate storage area or to the line stocking devices," says Ronald Dix, manager of market development and marketing communications, Volvo of America Corp., Automated Systems Div., Sterling Heights, Mich. "And if you are using AGVs in assembly, those can be talking to the line stocking devices. One value of AGVs is the ability to use them throughout the organization: assembly and fabrication, and also material handling."

Some people, however, have reservations about AGVs. Mr. Schneible is aware of at least one installation where a firm is moving from AGVs back to a transport line because AGVs didn't provide the needed throughput.

And there are other potential problems. "No question; there is a need for good knowledge of the vehicles," says Mr. Clark. "They are tricky and a little difficult to install. It takes a good solid plant engineering and maintenance team to really know their intricacies. Nevertheless, they are becoming more reliable and simpler all the time, and we are seeing them increasingly accepted."

Another technology that is improving material handling operations is simulation: the ability to simulate factory operations on a computer screen before actually installing the hardware.

That new technology and the interest in it are why material handling is set for a bright new year! □

PRICE & PRODUCTION DATA

(Effective November 10, 1986)

Steel production by districts, thousands of tons (000 omitted)

	Last Week	Two Weeks Ago	Month Ago	Year Ago
Northeast Coast	135	141	129	171
Pittsburgh	168	177	178	148
Youngstown	107	112	113	97
Lake Erie	102	109	105	122
Detroit	148	148	141	152
Chicago	322	341	305	467
Midwest	156	165	152	155
Southern	141	147	135	184
Western	41	43	41	77
U.S. Production	1,320	1,383	1,299	1,578

Source: American Iron & Steel Institute

Lake Superior Ore Prices

51.50% Fe Natural delivered lower Lake ports unless otherwise stated. Rail transportation, handling and unloading may be charged to buyer. Coarse ore 80¢ premium.

Pellets (per iron unit natural)	gross-ton 58.0*
Pellets (per iron unit natural)	gross-ton 59.4**
Pellets (per iron unit natural)	gross-ton 72.5-86.9***
Mesabi, regular-unscreened	gross-ton 32.53
Mesabi, non-bessemer	gross-ton 30.03-31.53

*58.0¢—Mineral Services, Inc. as of 8/13/85. **59.4¢—Inland Steel Mining, 1/1/85 and Pickands Mather, 8/1/85, delivered hold of vessel, upper Lake ports. ***72.5¢—U.S. Steel as of 8/16/85. 86.9¢—Oglebay Norton 3/25/82, Hanna Mining and Cleveland Cliffs, 2/26/82.

STEEL PRODUCTION, COMPOSITE PRICES

(Effective November 10, 1986)

U.S. Steel Production	Last Week	Two Weeks Ago	To Date 1986	To Date 1985
Net tons, in thousands	1,320	1,383	69,888	74,717
Capability Utilization Rate	54.6	57.2	63.8	65.4

Composite Prices	This Week	Week Ago	Month Ago	Year Ago
Finished Steel Base* (¢/lb.—eff. 8/31/86)	24.951	24.951	24.951	27.582
Pig Iron** (Net ton=2000 lbs.)	$213.00	$213.00	$213.00	$213.00
Scrap No. 1 hvy.*** (Gross ton=2240 lbs.)	$ 74.17	$ 74.17	$ 73.17	$ 68.83
No. 2 bundles	$ 50.50	$ 50.50	$ 50.50	$ 50.83

Scrap Comparison (Gross Ton)	This Week	Week Ago	Month Ago	Year Ago
No. 1 steel, Pittsburgh	$ 78.50	$ 78.50	$ 76.50	$ 69.50
No. 1 steel, Philadelphia	71.50	71.50	71.50	67.50
No. 1 steel, Chicago	72.50	72.50	71.50	69.50
No. 1 bundles, Detroit	75.50	75.50	72.50	56.50
Low Phos., Youngstown	75.50	75.50	72.50	66.50
No. 1 mach'y cast., Pgh	74.50	74.50	74.50	68.50
No. 1 mach'y cast., Phila	93.50	93.50	93.50	91.50
No. 1 mach'y cast., Chi	101.50	101.50	101.50	97.50

*Finished Steel Composite: Weighted index of steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

**Pig Iron Composite: Based on average prices for basic and foundry pig iron at representative producing points within the U.S.

***Steel Scrap Composite: Average of No. 1 hvy. melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

NONFERROUS PRICES

(Effective November 10, 1986) Prices obtained in trade based on representative tonnages per gross ton delivered to consumer unless otherwise stated.

Primary Metal Prices

(cents per lb.)	current price	last price	date of change
Aluminum (LME)	51.40	50.75	11/10/86
Copper (C)	62.00	63.00	10/31/86
Lead	27.50	26.75	11/7/86
Magnesium Ingot	153.00	148.00 165.00-	12/9/85
Nickel (LME)	169.00	166.00	11/10/86
Zinc	47.00	44.50	10/6/86

ALUMINUM: Avg. for last week & previous week. COPPER: (C)=cathode. LEAD: common grade. MAGNESIUM: 99.8% pig delivered. NICKEL: Avg. for last week & previous week. ZINC: high grade.

Antimony, American Laredo, Texas	$2.00
Beryllium-aluminum 5% Be, per lb. contained Be	$248.00
Beryllium-copper, per lb. cont. Be	$152.00
Beryllium 97% powder 200	$196.00
Cadmium, ton lots	$1.00
Calcium, ton lots, crown	$3.92
Chromium, 99.5% electro	$4.62
Cobalt, 99%, cathode	$12.50
Gold, per troy oz.	$410.75
Indium, per troy oz	$2.65
Iridium, per troy oz	$420.00
Magnesium sticks, 10,000 lbs.	$2.02
Mercury, per 76-lb., f.o.b. N.Y.	$215.00-220.00
Molybdenum, lb. tech. moly oxides, 20 lb. MO can	$3.45
Palladium, per troy oz	$128.70
Platinum, per troy oz	$573.00
Rhodium, per troy oz	$1,182.00
Silver ingots, per troy oz	$5.77
Titanium sponge, melt grade	$3.40-3.55
Tungsten powder, hyd red.	$9.50-9.85
Vanadium	$6.00
Zirconium sponge	$11.00-17.00

(Per lb. unless otherwise noted)

Straits Tin Price

(U.S. cents per lb. EX-SMELTER, based on daily market in Kuala Lumpur in Malaysian dollars per kilo.)

November 3—265.00
November 4—266.00
November 5—270.00
November 6—270.00
November 7—267.00

Scrap Prices

Brass Mill Scrap

(Cents per lb., over 20,000 lbs. add 1¢ per lb.)

	Solids	Turnings
Copper	56	51
Yellow brass	50	49½
Red brass	51	47
Comm. bronze	52½	47½
Mang. bronze	41½	40½
Free cutting rod ends	49	48

Custom Smelters Scrap

(Cents per lb., carload lots, del. refinery)

No. 1 copper wire	53
No. 2 copper wire	48
Light copper	41

Ingot Makers Scrap

(Cents per lb., carload lots, del. refinery)

No. 1 copper wire	49
No. 2 copper wire	40
Light copper	32
No. 1 composition	45
No. 1 comp. turnings	44
Hvy. yellow brass solids	30
Hvy. yellow brass turnings	25
Radiators	34

Aluminum

New mixed clips	34	— 35
Old sheet	31	— 32
Old cast	31	— 32
Clean dry borings	32	— 33

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Aluminum

Segregated clippings	28	— 29
Mixed L.C. clips	26	— 27
Old sheets and cast	23	— 24
Borings and turnings	19	— 20
Duraluminum clippings	24	— 25

Copper and Brass

No. 1 copper wire	44	— 47
No. 2 copper wire	35	— 36
Light copper	32	— 33
Radiators	22	— 23
No. 1 composition	36	— 37
No. 1 composition turnings	34	— 35
Cocks and faucets	30	— 31
Clean heavy yellow brass	26	— 28
Brass pipe	26	— 27
New soft brass clippings	39	— 40

Lead

Heavy soft lead	5	— 7
Whole batteries	1	— 3
Type metal	15	— 17
Electrotype	13	— 14

Nickel

Nickel solids	105	—115
Nickel rod ends	105	—115
Nickel sheets, clips	105	—115
Nickel turnings	25	— 35

Zinc

New zinc clippings	16	— 17
Old diecast zinc	12	— 13

(Effective November 10, 1986) Prices obtained in trade based on representative tonnages per gross ton delivered to consumer unless otherwise stated. Prices are the opinions of Iron Age editors and correspondents, based on contacts with dealers, brokers, generators and users in the industry on the effective date listed above.

Ferrous Scrap Prices

Pittsburgh

No. 1 hvy. melting	$ 78.00 to	$ 79.00
No. 2 hvy. melting	68.00 to	69.00
No. 1 dealer bundles	96.00 to	97.00
No. 1 factory bundles (auto)	98.00 to	99.00
No. 2 bundles	45.00 to	46.00
No. 1 busheling	94.00 to	95.00
Machine shop turnings	8.00 to	9.00
Shoveling turnings	45.00 to	46.00
Cast iron borings	44.00 to	45.00
Low phos. punchings plate	104.00 to	105.00
Heavy turnings	68.00 to	69.00
No. 1 RR hvy. melting	86.00 to	87.00
Rails, 2 ft and under	94.00 to	95.00
Scrap rails, random lgth	86.00 to	87.00
RR specialties	94.00 to	95.00
No. 1 machinery cast	74.00 to	75.00
Cupola cast	67.00 to	68.00
Heavy breakable cast	30.00 to	31.00
Stainless		
18-8 bundles and solids	485.00 to	495.00
18-8 turnings	385.00 to	395.00

Chicago

No. 1 hvy. melting	$ 72.00 to	$ 73.00
No. 2 hvy. melting	68.00 to	69.00
No. 1 dealer bundles	93.00 to	94.00
No. 1 factory bundles (auto)	93.00 to	94.00
No. 2 dealer bundles	57.00 to	58.00
No. 1 busheling	86.00 to	87.00
Shredder scrap	80.00 to	81.00
Machine shop turnings	22.00 to	23.00
Mixed borings and turnings	14.00 to	15.00
Shoveling turnings	23.00 to	24.00
Cast iron borings	39.00 to	40.00
Low phos. forge crop	93.00 to	94.00
Low phos. punchings plate 1/4 in. and heavier	111.00 to	112.00
Low phos. 2 ft and under	106.00 to	107.00
No. 1 RR hvy. melting	76.00 to	77.00
Scrap rails random lgth	79.00 to	80.00
Reroller rails	100.00 to	101.00
Rails, 2 ft and under	94.00 to	95.00
RR couplers and knuckles	79.00 to	80.00
RR car axles	104.00 to	105.00
No. 1 machinery cast	101.00 to	102.00
Cupola cast	89.00 to	90.00
Stove plate	97.00 to	98.00
Steel car wheels	85.00 to	86.00
Stainless		
18-8 bundles and solids	460.00 to	470.00
18-8 turnings	360.00 to	370.00
430 bundles and solids	125.00 to	135.00
430 turnings	85.00 to	95.00

Philadelphia

No. 1 hvy. melting	$ 70.00 to	$ 73.00
No. 2 hvy. melting	62.00 to	65.00
No. 1 dealer bundles	84.00 to	87.00
No. 2 dealer bundles	47.00 to	50.00
No. 1 busheling	84.00 to	87.00
Shredder scrap	82.00 to	85.00
Machine shop turnings	24.00 to	27.00
Mixed borings and turnings	24.00 to	27.00
Shoveling turnings	37.00 to	40.00
Low phos. 5 ft and under	79.00 to	82.00
Low phos. 2 ft punchings	91.00 to	94.00
Electric furnace bundles	93.00 to	96.00
RR specialties	79.00 to	82.00
Rails, 2 ft and under	94.00 to	97.00
Cupola cast	81.00 to	84.00
Heavy breakable cast	52.00 to	55.00
No. 1 machinery cast	92.00 to	95.00

Detroit

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 51.00 to	$ 52.00
No. 2 hvy. melting	50.00 to	51.00
No. 1 dealer bundles	75.00 to	76.00
No. 2 bundles	36.00 to	37.00
No. 1 busheling	73.00 to	74.00
Drop forge flashings	41.00 to	42.00
Machine shop turnings	24.00 to	25.00
Mixed borings and turnings	6.00 to	7.00
Shoveling turnings	24.00 to	25.00
Cast iron borings	21.00 to	22.00
Heavy breakable cast	32.00 to	33.00
Mixed cupola cast	47.00 to	48.00
Automobile cast	71.00 to	72.00
Stainless		
18-8 bundles and solids	450.00 to	460.00
18-8 turnings	310.00 to	320.00
430 bundles and solids	115.00 to	125.00

Youngstown

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 57.00 to	$ 58.00
No. 2 hvy. melting	55.00 to	56.00
No. 1 dealer bundles	77.00 to	78.00
No. 2 dealer bundles	32.00 to	33.00
Machine shop turnings	17.00 to	18.00
Shoveling turnings	17.00 to	18.00
Low phos. plate	75.00 to	76.00
Electric furnace bundles	64.00 to	65.00
Galvanized bundles	61.00 to	62.00

Cleveland

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 56.00 to	$ 57.00
No. 2 hvy. melting	54.00 to	55.00
No. 1 dealer bundles	82.00 to	83.00
No. 1 factory bundles	83.00 to	84.00
No. 2 bundles	30.00 to	31.00
No. 1 busheling	71.00 to	72.00
Machine shop turnings	17.00 to	18.00
Shoveling turnings	17.00 to	18.00
Cast iron borings	20.00 to	21.00
Cut structural & plates 5 ft and under	72.00 to	73.00
Cut structural & plates 2 ft and under	93.00 to	94.00
Low phos. punchings plate	93.00 to	94.00
Foundry steel, 2 ft & under	55.00 to	56.00
No. 1 RR hvy. melting	63.00 to	64.00
Rails, 2 ft and under	92.00 to	93.00
Rails, 18 in. and under	94.00 to	95.00
No. 1 machinery cast	83.00 to	84.00
Mixed cast	50.00 to	51.00
Stainless		
18-8 bundles	450.00 to	460.00
18-8 turning	315.00 to	325.00
430 bundles	120.00 to	130.00

Buffalo

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 55.00 to	$ 56.00
No. 2 hvy. melting	45.00 to	46.00
No. 1 busheling	75.00 to	76.00
No. 1 dealer bundles	75.00 to	76.00
No. 2 bundles	32.00 to	33.00
Machine shop turnings	13.00 to	14.00
Mixed borings and turnings	13.00 to	14.00
Shoveling turnings	19.00 to	20.00
Cast iron borings	27.00 to	28.00
Low phos. plate	78.00 to	79.00
Structural and plate 2 ft and under	80.00 to	81.00
Rails, 2 ft and under	79.00 to	80.00
Scrap rails, random lgth	61.00 to	62.00
No. 1 machinery cast	75.00 to	76.00
No. 1 cupola cast	71.00 to	72.00

St. Louis

No. 1 hvy. melting	$ 70.00 to	$ 71.00
No. 2 hvy. melting	59.00 to	60.00
No. 1 busheling	80.00 to	81.00
No. 1 dealer bundles	84.00 to	85.00
No. 2 bundles	55.00 to	56.00
Machine shop turnings	15.00 to	16.00
Shoveling turnings	19.00 to	20.00
Cast iron borings	26.00 to	27.00
No. 1 RR hvy. melting	78.00 to	79.00
Rails, random length	74.00 to	75.00
Rails, 5 ft and under	89.00 to	90.00
RR specialties	77.00 to	78.00
Cupola cast	66.00 to	67.00
Heavy breakable cast	40.00 to	41.00
Stove plate	85.00 to	86.00
Steel car wheels	85.00 to	86.00
Rerolling rails	99.00 to	100.00
Unstripped motor blocks	49.00 to	50.00

Birmingham

No. 1 hvy. melting	$ 73.00 to	$ 74.00
No. 2 hvy. melting	69.00 to	70.00
No. 1 dealer bundles	73.00 to	74.00
No. 2 bundles	49.00 to	50.00
No. 1 busheling	73.00 to	74.00
Shredder scrap	95.00 to	96.00
Machine shop turnings	25.00 to	26.00
Shoveling turnings	36.00 to	37.00
Cast iron borings	36.00 to	37.00
Electric furnace bundles	69.00 to	70.00
Elec. furnace, 3 ft & under	75.00 to	76.00
Structural and plate, 2 ft	90.00 to	91.00
Structural and plate, 4 ft	83.00 to	84.00
No. 1 RR hvy. melting	83.00 to	84.00
Scrap rails, random lgth	73.00 to	74.00
Rails, 2 ft and under	93.00 to	95.00
Angles and splice bars	83.00 to	84.00
No. 1 cupola cast	82.00 to	83.00
Unstripped motor blocks	74.00 to	75.00

Cincinnati

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 54.00 to	$ 55.00
No. 2 hvy. melting	49.00 to	50.00
No. 1 dealer bundles	74.00 to	75.00
No. 2 bundles	32.00 to	33.00
Machine shop turnings	9.00 to	10.00
Shoveling turnings	12.00 to	13.00
Cast iron borings	19.00 to	20.00
Low phos. 18 in. and under	77.00 to	78.00
Rails, random length	59.00 to	60.00
Rails, 2 ft and under	75.00 to	76.00
No. 1 cupola cast	65.00 to	66.00
Heavy breakable cast	25.00 to	26.00
Drop broken cast	67.00 to	68.00

New York

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 38.00 to	$ 40.00
No. 2 hvy. melting	31.00 to	32.00
No. 2 dealer bundles	20.00 to	22.00
Mixed borings and turnings	10.00 to	11.00
Machine shop turnings	4.00 to	6.00
Shoveling turnings	10.00 to	12.00
Clean cast chem. borings	35.00 to	36.00
No. 1 machinery cast	79.00 to	80.00
Mixed yard cast	50.00 to	51.00
Heavy breakable cast	10.00 to	12.00
Stainless		
18-8 prepared solids	380.00 to	400.00
18-8 turnings	280.00 to	320.00
430 prepared solids	90.00 to	100.00
430 solids	75.00 to	85.00

Boston

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 49.00 to	$ 51.00
No. 2 hvy. melting	39.00 to	41.00
No. 1 dealer bundles	53.00 to	55.00
No. 2 bundles	32.00 to	34.00
No. 1 busheling	56.00 to	58.00
Shredder scrap	59.00 to	61.00
Machine shop turnings	12.00 to	14.00
Shoveling turnings	18.00 to	20.00
No. 1 machinery cast	72.00 to	77.00
Mixed cupola cast	44.00 to	46.00
Heavy breakable cast	8.00 to	10.00

San Francisco

No. 1 hvy. melting	$ 40.00 to	$ 42.00
No. 2 hvy. melting	34.00 to	36.00
No. 1 dealer bundles	31.00 to	33.00
No. 2 dealer bundles	20.00 to	21.00
Machine shop turnings	8.00 to	9.00
Cast iron borings	8.00 to	9.00
No. 1 cupola cast	80.00 to	82.00

Los Angeles

No. 1 hvy. melting	$ 34.00 to	$ 36.00
No. 2 hvy. melting	28.00 to	30.00
No. 1 dealer bundles	26.00 to	28.00
No. 2 dealer bundles	16.00 to	18.00
Machine shop turnings	9.00 to	10.00
Shoveling turnings	10.00 to	11.00
Cast iron borings	8.00 to	9.00
Elec. furnace 1 ft and under (foundry)	67.00 to	69.00
No. 1 cupola cast	72.00 to	74.00

Seattle

No. 1 hvy. melting	$ 60.00 to	$ 62.00
No. 2 hvy. melting	51.00 to	53.00
No. 2 bundles	35.00 to	37.00
No. 1 cupola cast	89.00 to	90.00
Mixed yard cast	80.00 to	82.00

Hamilton, Ont.

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 74.00
No. 2 hvy. melting, cut 2 ft and under	66.00
No. 1 dealer bundles	82.00
No. 2 bundles	58.00
Mixed steel scrap	53.00
Bush. new fact. prep'd	77.00
Bush. new fact. unprep'd	60.00
Machine shop turnings	30.00
Short steel turnings	30.00
Mixed borings and turning	19.00
Cast scrap	97.00

Houston

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 62.00 to	$ 63.00
No. 2 hvy. melting	52.00 to	53.00
No. 2 bundles	33.00 to	34.00
Machine shop turnings	13.00 to	14.00
Crushed turnings	23.00 to	24.00
Shredder scrap	71.00 to	72.00
Cut structural plate, 2 ft and under	88.00 to	89.00
Cut structural plate, 5 ft and under	70.00 to	71.00
Unstripped motor blocks	54.00 to	55.00
Cupola cast	81.00 to	82.00

MIXED SIGNS CLOUD ORDERS OUTLOOK

Orders going to durable goods producers set off some fireworks in September. These orders scored their biggest monthly rise since November 1984; they were up 5 pct to $109 billion.

Reaction to this surge was mixed. Some read 'turnaround' in the September orders jump; others attributed the rise to 'one time factors.'

Those who saw a turnaround taking place claimed that the fallen dollar is finally making life tough in the marketplace for foreigners and easier for U.S. manufacturers.

But some think the September order numbers were influenced by auto sales incentives and the new tax law.

Those who see the tax law giving a one-time shot to orders point to the 8.7 pct jump in nondefense capital goods orders—orders rushed ahead to beat next year's tougher laws on depreciation.

Even if a favorable turnaround in orders is shaping up, it will be some time before it is felt by many durable goods producers. For instance, the $109 billion September orders total was still up only fractionally from the monthly orders total scored back in January.

Orders for transportation equipment accounted for $2.3 billion of the $5.2 billion September increase for all durable goods. This meant that orders for transportation goods were up 8.5 pct to $29 billion. About half of this increase was in orders for aircraft and parts and the other half in orders for motor vehicles and parts.

Orders for electrical machinery were up $1.8 billion, or 11 pct, to $17.7 billion. And in the key nonelectrical machinery category, orders were up $0.2 billion, or 1.3 pct, to $16.8 billion.

Billions of Dollars, Seasonally adjusted Monthly Total, unless otherwise noted Source: U.S. Dept of Commerce		Latest Month or Qtr.	Previous Month or Qtr.	Same Period Year Ago
CAPITAL EXPENDITURES (Annual Rates)				
U.S. Industry, Total	4th Q*	$396.6	$388.9	$397.7
Manufacturing, Total	4th Q*	157.2	148.5	158.6
Manufacturing, Durable Goods	4th Q*	77.0	71.4	75.9
Mining Industry	4th Q*	11.4	12.5	15.4
KEY INDICATORS, Durable Goods Manufacturing				
New Orders	Sept.	109.0	103.8	106.6
Shipments	Sept.	106.1	104.2	103.7
Inventories	Sept.	186.2	186.0	191.9
Unfilled Orders	Sept.	357.7	354.8	356.5
NEW ORDERS, METALWORKING				
Capital Goods Producers, Nondefense Industries	Sept.	28.6	26.3	29.2
Capital Goods Producers Defense Industries	Sept.	8.6	8.3	8.1
Primary Metals, Total	Sept.	9.8	10.2	10.2
Steel (SIC 331)	Sept.	4.2	4.5	4.2
Iron & Steel Castings (SIC 332)	Sept.	1.1	1.1	1.3
Nonferrous Metals	Sept.	4.5	4.6	4.7
Nonelectrical Mach.-Equip. Industries, Total	Sept.	16.8	16.6	17.4
Engines & Turbines	Sept.	1.6	0.9	1.2
Farm Mach.& Equipment (Shipments)	Sept.	0.8	0.8	0.8
Construction, Mining & Mat. Hdlg. Equip	Sept.	2.2	2.5	2.8
General Industrial Machinery	Sept.	1.5	1.3	1.5
Metalworking Machinery	Sept.	1.0	0.7	1.0
Machine Tools, Total ($Mill.)**	Sept.	134.8	154.4	174.1
Machine Tools, Metalcutting**	Sept.	100.0	115.1	124.1
Machine Tools, Metalforming**	Sept.	34.8	39.3	50.0
Electrical Mach. & Equip. Industries, Total	Sept.	17.7	16.0	16.9
Elec. Transmission & Ind. Equip.	Sept.	2.2	2.1	2.0
Household Appliances	Sept.	1.7	1.5	1.5
Communication Equipment	Sept.	6.1	5.3	6.8
Transportation Equipment,Total	Sept.	29.0	26.7	28.1
Motor Vehicles & Parts (Shipments)	Sept.	17.8	17.0	17.3
Aircraft, Missiles & Parts	Sept.	9.5	8.5	9.2
Shipbuilding & Military Tanks	Sept.	0.8	0.6	0.9
Fabricated Metal Products, Total	Sept.	14.0	13.7	14.4
Instruments, Total	Sept.	4.8	4.6	4.6

*Est.—Commerce Dept; **Source: NMTBA

IRON AGE

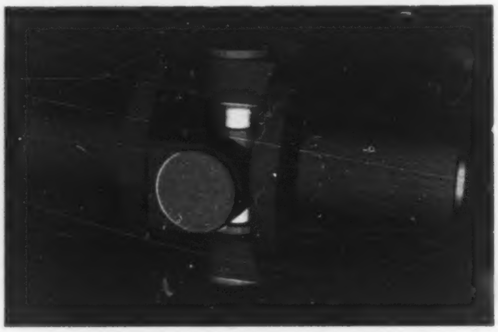
FEBRUARY 1987

MANUFACTURING MANAGEMENT

C2150-8
2/24/87

Automakers & Steelmakers Team Up to Improve Quality

Why Micro Cad is Sweeping the Country



Yes,
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Can Export

IRON AGE
MANUFACTURING MANAGEMENT

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ONE OF THE ABC PUBLISHING COMPANIES

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U.S. BATTLES THE WORLD WITH MORE EXPORTS AND OFFSHORE MANUFACTURING

American exporters have learned that they must be able to export whether the dollar is weak or strong. The weak dollar is helping them now, but success in exporting depends on more fundamental factors.

BY BRYAN BERRY

The strong dollar has been a primary cause of the U.S. trade deficit that's spiralled higher and higher over the past five years. Now the dollar has fallen 40 pct against the Japanese yen and Deutschemark since its peak in February 1985.

"We can't alibi that the yen is the problem now," said Chrysler Chairman Lee Iacocca at a recent press conference. "We can't be crybabies any more."

Ironically, the initial impact of the weaker dollar was to raise the dollar value of our trade deficit. That's because the imports from Japan and Germany now have a higher dollar value. Manufacturers in those countries, however, don't plan to lose their U.S. market share by raising their prices as much as their currencies have risen. The result: thinner profit margins and even operating losses for some Japanese and German companies.

The total U.S. trade deficit of $149 billion in 1985 grew to about $170 billion in 1986, including a $137 billion deficit in manufactured goods. But the trade deficit peaked in 1986, say senior Dept. of Commerce (DOC) economists. They predict it will fall to $140-150 billion this year.

U.S. exports to both Japan and the European Economic Community (EEC) declined from 1984 to 1985. But last year they rose sharply. U.S. exports to Japan increased 19 pct from the first nine months of 1985 to the same period in 1986, from $17 billion to $20 billion. Exports to the EEC rose from $37 billion to $39 billion.

It takes 24 months for a change in the exchange rate to make its full impact on the trade deficit, estimate DOC economists. The two-year period ends this month—which means that U.S. business will get all the benefits of the weak dollar this year.

However, the exchange rate will help our trade only with Japan and Europe. The dollar has remained about the same against the currencies of Canada, Australia, Latin America and such newly industrialized countries in Asia as Korea and Taiwan.

Other problems not helped by our weak dollar are the poor economies and huge debts of many Latin American nations.

Also, the Japanese and European economies have been growing, but not fast enough to greatly increase their imports.

Still, U.S. industry exported $213 billion in 1985, including $47 billion to Canada, $46 billion to the EEC, and $23 billion to Japan. Those figures will grow this year, and the weak dollar is just one reason why.

The first lesson successful American exporters have learned is that they must be able to export whether the dollar is weak or strong. The weak dollar is helping them now, but their success in exporting depends on more fundamental factors: How unique is their product, how efficient is their manufacturing, how good is their quality?

Such factors explain why Japanese manufacturers have been able to continue increasing their exports whether the yen is strong or weak. Some Japanese automakers even have plans to streamline operations so that they can make a profit when the yen is even stronger than now.

Unfortunately, many American businessmen believe that low cost is the major strength of Japanese companies. This is a myth, charged Michael E. Porter, a professor at Harvard Business School, in a speech last year.

"We must innovate in areas that our competitors can't easily imitate," said Mr. Porter. "We can develop advantages based on technology, on distribution, on how we relate to the customer, and on how we differentiate our products."

Too many American companies

Our Top Trading Partners in Manufactured Goods (1985)

(In Billions of Dollars)

Country	Exports	Imports	Surplus or Deficit
Canada	42.4	50.6	-8.2
Japan	12.4	71.6	-59.2
Mexico	10.8	9.1	+1.7
United Kingdom	10.1	11.2	-1.1
W. Germany	7.5	20.3	-12.8
France	5.2	8.6	-3.4
Australia	5.1	0.8	+4.3
The Netherlands	4.3	2.9	+1.4
Saudi Arabia	3.9	0.2	+3.7
South Korea	3.6	10.5	-6.9
Italy	3.0	8.9	-5.9
Singapore	3.0	3.8	-0.8
Taiwan	2.9	17.3	-14.4
Brazil	2.2	4.7	-2.5
Hong Kong	2.1	8.9	-6.8

Source: U.S. Dept. of Commerce

with plants and salespeople around the globe are not coordinating them globally, said Mr. Porter. In many cases, U.S. companies are positioned internationally even better than the Japanese. Companies like General Motors, Ford, Timken, and Federal-Mogul have had European facilities for several decades. Some have had plants in Korea, Taiwan, Australia, and other Pacific countries since after World War II. The people in some countries, like Korea, prefer to do business with Americans, not Japanese.

But American companies have tended to squander such advantages. They've taken a "multi-domestic approach to international strategy," said Mr. Porter, and developed companies with a "local face," said University of Michigan business professor C.K. Prahalad.

U.S. Trade in Manufactured Goods, 1980 - 1985

(In Billions of Dollars)

Year	Exports	Imports	Surplus or Deficit
1980	156	139	+17
1981	167	156	+11
1982	151	158	-7
1983	143	178	-35
1984	158	242	-84
1985	162	269	-107

Source: U.S. Dept. of Commerce

In an extreme example, General Motors in Detroit had almost no links with its British and German subsidiaries, Vauxhall and Opel, in the late 1970s. In contrast, Honda and Nissan's Japanese headquarters help fine-tune production at their U.S. plants to meet world market demand.

Battling Foreign Competition

Mr. Prahalad vigorously preaches the importance of U.S. firms challenging foreign competitors in their own home markets. "Take on the Japanese where they're most vulnerable—in Japan," he advises. "When the Japanese come to the U.S. to compete, they expose maybe 15 pct of their capital flow to U.S. competition. Perhaps 90 pct of the U.S. firm's capital flow is exposed to the Japanese competition, so it's in much greater danger."

When Michelin invaded the U.S. tire market, Goodyear struck back at Michelin's European base—blunting the French company's attempt to grab U.S. market share.

Too often U.S firms have jumped into foreign markets through joint ventures with foreign firms. American firms gave Japanese companies their technology in exchange for access to the Japanese market. The result, points out University of Michigan business professor Vladimir Pucik: "The Japanese competitors got the American technology and kept their home market." Later they used this technology to invade the U.S. market.

"Joint ventures are a symptom of the problem, not a solution," said Mr. Pucik. American companies' first priority should be beating the Japanese and European competition, preferably in their own home markets.

The same is true when Japanese companies seek joint ventures with U.S. companies in the U.S. "If access to the U.S. market is our strength, we shouldn't give that up easily to the Japanese," said the professor.

Joint ventures that make sense,

said Mr. Pucik, are ones in which neither partner is dominant and both companies win something. Equity relationships sometimes are advisable, too.

"We certainly want to keep our highly proprietary technologies to ourself," said Robert R. Kurth, Borg-Warner Automotive (BWA) Inc.'s director of strategic marketing.

BWA has set up wholly owned subsidiaries in Great Britain. West Germany, Japan, and Canada to manufacture proprietary transmission components. BWA also has joint ventures in Mexico, Colombia, Venezuela, and Japan.

Thirty-six pct of BWA's $1.1 billion in worldwide sales are to foreign automakers. The company exports manual transmissions, emission-control devices, and transmission components from its U.S. plants. Some of these come back to the U.S. in imported cars.

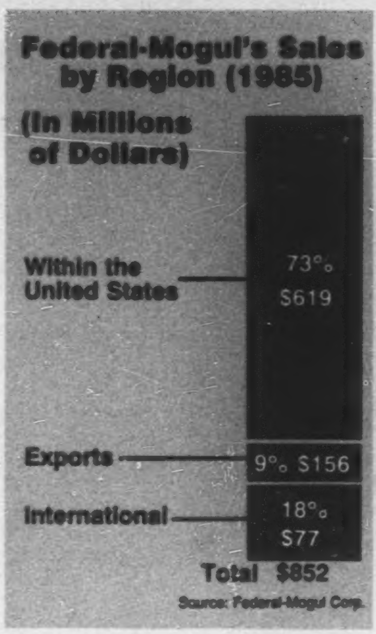
Exports by Small Companies

It's not just the billion-dollar firms that are exporting from their U.S. plants. University of Michigan professor William G. Moller, Jr. recently identified 165 exporting companies within a single county, Washtenaw, which includes Ann Arbor, Mich. Most of these firms have $10-15 million in annual sales. Exports account for 5 pct or less of sales of half the companies.

Significantly, none of the Washtenaw County companies that were exporting in 1980 had stopped doing so by 1985—despite the big jump in the dollar's exchange rate. Of the 165 firms, 23 pct make machinery other than electrical; 21 pct, measuring, analyzing, and controlling instruments; 17 pct, business services; and 10 pct, electrical and electronic machinery.

Many of the smaller and medium-size exporters in southeastern Michigan ship to U.S.-owned auto, tractor, or supplier plants in Canada, Mexico, and Europe.

Manchester Stamping Corp. (Manchester, Mich.), for example, tools up for GM, Ford, and Chrysler's U.S. plants and ships the same-type metal stampings and assemblies to the Big 3's Canadian plants. Exports make up 5 pct of its annual $11 million in sales. So far all the exports are due to U.S.-issued orders.


Federal-Mogul's Sales by Region (1985) (In Millions of Dollars)

Source: Federal-Mogul Corp.

Now company president Wayne T. Hamilton wants to sell his stampings directly to foreign buyers. "The future lies in being able to export to countries like Japan, Mexico, Korea, and others in Europe and on the Pacific Rim," Mr. Hamilton told *Iron Age*.

Sixty companies in Washtenaw County that are not exporting now told Prof. Moller that they expect to or want to begin exporting this year.

Pricing and Exchange Rates

In the steel-supplier industry, a medium-size exporter is Consolidated Ceramic Products (CCP) and its subsidiary, Comat (Blanchester, Ohio). Comat exports tundish boards and impact pads to the major Canadian steelmakers.

CCP exports thermocouple protection tubes and fluxing pipes (through which gas is injected into molten aluminum in reverb furnaces) to Canada, Western Europe, Israel, Egypt, Australia, and Thailand. The two companies' exports add up to less than $5 million, 10 pct of their sales.

Comat has another foreign connection: Its tundish boards use technology licensed from Germany's Heinrich Odermath GMBH. Odermath has licensed Comat to sell the boards only in the U.S. and Canada. Comat's impact boards use Comat's own technology, so Comat can sell them outside North America.

R. Bruce Mickey, president of CCP and Comat, attributes the companies' success in exporting to the uniqueness of their products. "If we had a me-too product, we simply couldn't sell it around the world," said Mr. Mickey.

Since the art of steelmaking varies from country to country, Comat designs its tundish boards differently for different countries. As long as the boards' price is in the same ballpark as its competitors, pricing is not a major issue, said Mr. Mickey.

"The commodity-type products are more affected by the exchange rate than the kind of specialized, proprietary products we sell," said Richard M. Szary, group vice president and group executive for Federal-Mogul's general products group.

Federal-Mogul (F-M) exports to Japan several million dollars' worth of fasteners for the aircraft and industrial markets plus (from its English plant) air spindles for computer and circuit-board makers. So far the stronger yen has not enabled the Detroit-based F-M to raise its exports to Japan.

On the other hand, the weaker dollar has helped F-M increase its exports of bearings, seals, and valves to the European aftermarket. Mr. Szary estimates that the exchange rate affects the volume of such exports by 5-10 pct.

Manufacturing Abroad

Federal-Mogul acquired, rather than built, most of its manufacturing facilities in France, Spain, Italy, West Germany, and Great Britain.

(Cont. on p. 23.)

Twenty seven pct of the company's $852 million in sales in 1985 were to foreign countries: $156 million from F-M's overseas plants and $77 million by export from the U.S.

"We do most of our manufacturing for the European original equipment market in Europe," explained Mr. Szary. "We export from our U.S. plants more for the aftermarket, since that can be served equally well by U.S. exports or European manufacturing."

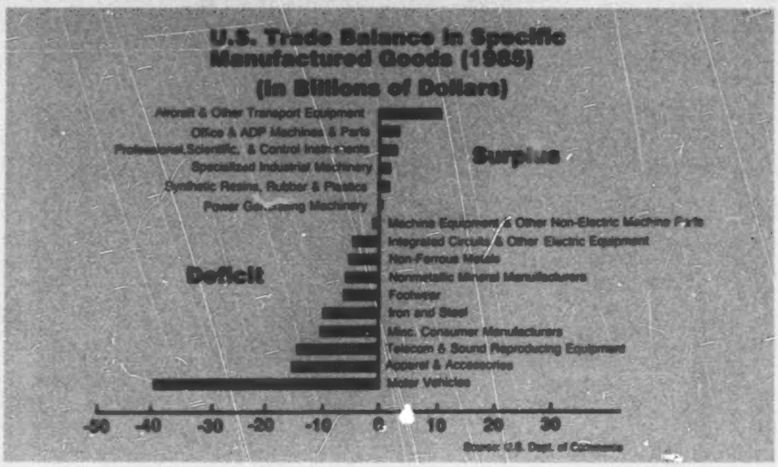
The aftermarket worldwide accounted for 46 pct of F-M's sales but 53 pct of its $131 million profit in 1985.

Timken sells bearings to 90 industries in 150 countries. It's sold to such Pacific Rim nations as South Korea and Taiwan since the end of World War II and today exports between $25 million and $50 million from the U.S. to nations in that region.

"Bearings are important to the growing economies of developing nations, so they are a good market," said John F. Hill, director of bearing marketing in North and South America for the Canton, Ohio-based Timken. Taiwan has no local bearing maker, so Timken has a significant market share there. Korea is a strong market, too.

Timken has been manufacturing bearings in England for more than 50 years and now has nearly half the tapered-bearing market there. The company also has plants in France, Canada, Brazil, Australia, and South Africa. It exports less than 20 pct of its U.S. production, shipping products that are not economical to make abroad.

"We usually must make 100,000 pieces per year of each part for economies of scale," explained Mr. Hill. "Generally 80 pct of our business comes from 20 pct of the parts numbers." Timken's Australian plant makes the 10-20 pct of the parts that comprise 80 pct of the business volume. The other parts are imported.



Proprietary Technology

American companies with distinctive technology have scored major successes abroad. The diaphragm carburetors of Walbro Corp. (Cass City, Mich.) are compact units that work in any position. Walbro is manufacturing these products for chain saws and string trimmers in its plants in Japan, Singapore, and Mexico. The company has become the world's largest maker of such small-engine carburetors, supplying 90 pct of the Japanese market and 70 pct of the world market.

Likewise, Walbro makes a distinctive rotary electric fuel pump for automotive fuel-injection systems, supplying both the original equipment and aftermarkets. As automakers around the world use more fuel-injection systems, Walbro's sales of these pumps keep growing.

Last year Walbro formed a joint venture with Champion Spark Plug Co. (Toledo, Ohio) to sell automotive fuel systems in Europe. Champion already sells spark plugs to numerous foreign and domestic vehicle and small equipment makers.

Other success stories abroad include Garrett Corp. (Los Angeles), a leading supplier of turbochargers to automakers in Japan, Europe, and Latin America; and Loctite Corp. (Newington, Conn.), which has the dominant share of the market for industrial and consumer adhesives in Japan. Eaton, which exports about $25 million in truck components from the U.S., has 90 pct of the market for class 8 truck transmissions in Australia.

Korea, China, Taiwan, Singapore, Canada, and Brazil offer perhaps the most attractive prospects for American firms considering exporting or manufacturing abroad. Korean firms are actively seeking U.S. partners and U.S. products in such fields as factory automation. Korean automaker Hyundai has bought Goodyear tires and Libbey-Owens-Ford glass and wants more U.S. parts.

The U.S. continues to do more trade with Canada than with any other nation. In 1985 the U.S. exported $42 billion and imported $51 billion of manufactured goods from Canada.

U.S. companies can receive aid in exporting from the U.S. Dept. of Commerce's International Trade Administration. Exporters to Japan can consider trading firms such as Mitsui & Co., U.S.A. (New York City), which handles $3.5 billion of U.S. exports to Japan each year. The Japan External Trade Organization (Chicago) helps set up ventures between U.S. and Japanese firms.

As U.S. companies step up their exports, they'll have to become more knowledgeable about foreign products and business practices. The alternative is to sit and wait for foreign manufacturers to take over the U.S market. □

MATERIALS PRICES

PRICE & PRODUCTION DATA

(Effective January 5, 1987)

Steel production by districts, thousands of tons
(000 omitted)

	Last Week	Two Weeks Ago	Month Ago	Year Ago
Northeast Coast	131	107	130	157
Pittsburgh	180	148	162	194
Youngstown	105	90	114	85
Lake Erie	105	112	103	113
Detroit	150	143	146	120
Chicago	335	308	338	467
Midwest	159	154	180	156
Southern	144	129	144	196
Western	40	36	42	75
U.S. Production	1,349	1,227	1,359	1,563

Source: American Iron & Steel Institute

Lake Superior Ore Prices

51.50% Fe Natural delivered lower Lake ports unless otherwise stated. Rail transportation, handling and unloading may be charged to buyer. Coarse ore 80¢ premium.

Pellets (per iron unit natural)	gross-ton 58.0*
Pellets (per iron unit natural)	gross-ton 59.4**
Pellets (per iron unit natural)	gross-ton 72.5-86.9***
Mesabi, regular-unscreened	gross-ton 32.53
Mesabi, non-bessemer	gross-ton 30.03-31.53

*58.0¢—Mineral Services, Inc. as of 8/13/85. **59.4¢—Inland Steel Mining, 1/1/85 and Pickands Mather, 8/1/85, delivered hold of vessel, upper Lake ports. ***72.5¢—U.S. Steel as of 8/16/85. 86.9¢—Oglebay Norton 3/25/82; Hanna Mining and Cleveland-Cliffs, 2/26/82.

STEEL PRODUCTION, COMPOSITE PRICES

(Effective January 5, 1987)

U.S. Steel Production	Last Week	Two Weeks Ago	To Date 1986	To Date 1985
Net tons, in thousands	1,349	1,227	—	—
Capability Utilization Rate	55.8	50.7	—	—

Composite Prices	This Week	Week Ago	Month Ago	Year Ago
Finished Steel Base* (¢/lb.—eff. 1/4/87)	25.236	24.951	24.951	24.607
Pig Iron** (Net ton= 2000 lbs.)	$213.00	$213.00	$213.00	$213.00
Scrap No. 1 hvy.*** (Gross ton=2240 lbs.)	$ 76.50	$ 74.50	$ 74.17	$ 73.17
No. 2 bundles	$ 52.17	$ 50.50	$ 50.50	$ 52.83

Scrap Comparison (Gross Ton)				
No. 1 steel, Pittsburgh	$ 79.50	$ 79.50	$ 78.50	$ 73.50
No. 1 steel, Philadelphia	71.50	71.50	71.50	71.50
No. 1 steel, Chicago	78.50	72.50	72.50	74.50
No. 1 bundles, Detroit	80.50	75.50	75.50	70.50
Low Phos., Youngstown	79.50	79.50	75.50	73.50
No. 1 mach'y cast., Pgh	74.50	74.50	74.50	68.50
No. 1 mach'y cast., Phila	93.50	93.50	93.50	91.50
No. 1 mach'y cast., Chi	101.50	101.50	101.50	104.50

*Finished Steel Composite: Weighted index of steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.
**Pig Iron Composite: Based on average prices for basic and foundry pig iron at representative producing points within the U.S.
***Steel Scrap Composite: Average of No. 1 hvy. melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

NONFERROUS PRICES

(Effective January 5, 1987) Prices obtained in trade based on representative tonnages per gross ton delivered to consumer unless otherwise stated.

Primary Metal Prices

(cents per lb.)	current price	last price	date of change
Aluminum (LME)	51.00	51.70	1/5/87
Copper (C)	64.00	63.50	1/5/87
Lead	28.00	27.50	12/19/86
Magnesium Ingot	153.00	148.00	12/9/85
Nickel (LME)	162.00	160.00	1/5/87
Zinc	47.00	44.50	10/6/86

ALUMINUM: Avg. for last week & previous week. COPPER (C)=cathode. LEAD: common grade. MAGNESIUM: 99.8% pig. delivered. NICKEL: Avg. for last week & previous week. ZINC: high grade.

Antimony, American Loredo, Texas	$2.00
Beryllium-aluminum 5% Be, per lb. contained Be	$248.00
Beryllium-copper, per lb. cont. Be.	$152.00
Beryllium 97% powder 200	$196.00
Cadmium, ton lots	$1.50
Calcium, ton lots, crown	$3.92
Chromium, 99.5% electro	$4.62
Cobalt, 99%, cathode	$12.50
Gold, per troy oz.	$403.50
Indium, per troy oz.	$2.87
Iridium, per troy oz.	$410.00
Magnesium sticks, 10,000 lbs.	$2.02
Mercury, per 76-lb., f.o.b. N.Y.	$210.00-220.00
Molybdenum, lb. tech. moly oxides, 20 lb. MO can	$3.45
Palladium, per troy oz.	$117.00
Platinum, per troy oz.	$484.00
Rhodium, per troy oz.	$1,100.00
Silver ingots, per troy oz.	$5.43
Titanium sponge, melt grade	$3.40-3.55
Tungsten powder, hyd red.	$9.53-9.85
Vanadium	$6.00
Zirconium sponge	$11.00-17.00

(Per lb. unless otherwise noted)

Straits Tin Price

(U.S. cents per lb. EX-SMELTER, based on daily market in Kuala Lumpur in Malaysian dollars per kilo.)

December 29—288.00
December 30—289.50
December 31—290.00
January 1—Holiday
January 2—Holiday

Scrap Prices
Brass Mill Scrap

(Cents per lb.; over 20,000 lbs. add 1¢ per lb.)

	Solids	**Turnings**
Copper	56	51
Yellow brass	49	48½
Red brass	50	46
Comm. bronze	51½	46½
Mang. bronze	39½	38½
Free cutting rod ends	48	47

Custom Smelters Scrap

(Cents per lb., carload lots, del. refinery)

No. 1 copper wire	55
No. 2 copper wire	47
light copper	41

Ingot Makers Scrap

(Cents per lb., carload lots, del. refinery)

No. 1 copper wire	49
No. 2 copper wire	40
light copper	33
No. 1 composition	42
No. 1 comp. turnings	42
Hvy. yellow brass solids	29
Hvy. yellow brass turnings	24
Radiators	27

Aluminum

New mixed clips	31 — 32
Old sheet	28 — 29
Old cast	28 — 29
Clean dry borings	29 — 30

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound

Aluminum

Segregated clippings	26 — 27
Mixed L.C. clips	24 — 25
Old sheets and cast	21 — 22
Borings and turnings	17 — 18
Duraluminum clippings	22 — 23

Copper and Brass

No. 1 copper wire	44 — 47
No. 2 copper wire	35 — 36
light copper	32 — 33
Radiators	22 — 23
No. 1 composition	36 — 37
No. 1 composition turnings	34 — 35
Cocks and faucets	30 — 31
Clean heavy yellow brass	26 — 28
Brass pipe	26 — 27
New soft brass clippings	39 — 40

Lead

Heavy soft lead	9 — 10
Whole batteries	1 — 2
Type metal	17 — 18
Electrotype	14 — 15

Nickel

Nickel solids	100 —110
Nickel rod ends	100 —110
Nickel sheets, clips	100 —110
Nickel turnings	25 — 35

Zinc

New zinc clippings	15 — 16
Old diecast zinc	11 — 12

EFFECTIVE JANUARY 5, 1987

(Effective January 5, 1987) Prices obtained in trade based on representative tonnages per gross ton delivered to consumer unless otherwise stated. Prices are the opinions of Iron Age editors and correspondents, based on contacts with dealers, brokers, generators and users in the industry on the effective date listed above.

Ferrous Scrap Prices

Pittsburgh

No. 1 hvy. melting	$ 79.00 to	$ 80.00
No. 2 hvy. melting	69.00 to	70.00
No. 1 dealer bundles	99.00 to	100.00
No. 1 factory bundles (auto)	100.00 to	101.00
No. 2 bundles	45.00 to	46.00
No. 1 busheling	98.00 to	99.00
Machine shop turnings	8.00 to	9.00
Shoveling turnings	45.00 to	46.00
Cast iron borings	44.00 to	45.00
Low phos. punchings plate	106.00 to	107.00
Heavy turnings	68.00 to	69.00
No. 1 RR hvy. melting	88.00 to	89.00
Rails, 2 ft. and under	97.00 to	98.00
Scrap rails, random lgth.	85.00 to	86.00
RR specialties	98.00 to	99.00
No. 1 machinery cast	74.00 to	75.00
Cupola cast	67.00 to	68.00
Heavy breakable cast	30.00 to	31.00
Stainless		
18-8 bundles and solids	485.00 to	495.00
18-8 turnings	385.00 to	395.00

Chicago

No. 1 hvy. melting	$ 78.00 to	$ 79.00
No. 2 hvy. melting	74.00 to	75.00
No. 1 dealer bundles	94.00 to	95.00
No. 1 factory bundles (auto)	97.00 to	98.00
No. 2 dealer bundles	62.00 to	63.00
No. 1 busheling	89.00 to	90.00
Shredder scrap	83.00 to	84.00
Machine shop turnings	22.00 to	23.00
Mixed borings and turnings	14.00 to	15.00
Shoveling turnings	23.00 to	24.00
Cast iron borings	39.00 to	40.00
Low phos. forge crop	94.00 to	95.00
Low phos. punchings plate 1/4 in. and heavier	113.00 to	114.00
Low phos. 2 ft. and under	107.00 to	108.00
No. 1 RR hvy. melting	82.00 to	83.00
Scrap rails random lgth	79.00 to	80.00
Reroller rails	100.00 to	101.00
Rails, 2 ft. and under	94.00 to	95.00
RR couplers and knuckles	79.00 to	80.00
RR car axles	104.00 to	105.00
No. 1 machinery cast	101.00 to	102.00
Cupola cast	89.00 to	90.00
Stove plate	99.00 to	100.00
Steel car wheels	85.00 to	86.00
Stainless		
18-8 bundles and solids	460.00 to	470.00
18-8 turnings	360.00 to	370.00
430 bundles and solids	125.00 to	135.00
430 turnings	85.00 to	95.00

Philadelphia

No. 1 hvy. melting	$ 70.00 to	$ 73.00
No. 2 hvy. melting	62.00 to	65.00
No. 1 dealer bundles	86.00 to	89.00
No. 2 dealer bundles	47.00 to	50.00
No. 1 busheling	85.00 to	88.00
Shredder scrap	84.00 to	87.00
Machine shop turnings	24.00 to	27.00
Mixed borings and turnings	24.00 to	27.00
Shoveling turnings	39.00 to	42.00
Low phos. 5 ft. and under	79.00 to	82.00
Low phos. 2 ft. punchings	91.00 to	94.00
Electric furnace bundles	96.00 to	99.00
RR specialties	81.00 to	84.00
Rails, 2 ft. and under	96.00 to	99.00
Cupola cast	81.00 to	84.00
Heavy breakable cast	52.00 to	55.00
No. 1 machinery cast	92.00 to	95.00

Detroit

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$ 53.00 to	$ 54.00
No. 2 hvy. melting	52.00 to	53.00
No. 1 dealer bundles	80.00 to	81.00
No. 2 bundles	39.00 to	40.00
No. 1 busheling	78.00 to	79.00
Drop forge flashings	44.00 to	45.00
Machine shop turnings	24.00 to	25.00
Mixed borings and turnings	6.00 to	7.00
Shoveling turnings	24.00 to	25.00
Cast iron borings	21.00 to	22.00
Heavy breakable cast	32.00 to	33.00
Mixed cupola cast	47.00 to	48.00
Automobile cast	71.00 to	72.00
Stainless		
18-8 bundles and solids	430.00 to	440.00
18-8 turnings	290.00 to	300.00
430 bundles and solids	115.00 to	125.00

Youngstown

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$ 63.00 to	$ 64.00
No. 2 hvy. melting	61.00 to	62.00
No. 1 dealer bundles	83.00 to	84.00
No. 2 dealer bundles	43.00 to	44.00
Machine shop turnings	17.00 to	18.00
Shoveling turnings	17.00 to	18.00
Low phos. plate	79.00 to	80.00
Electric furnace bundles	68.00 to	69.00
Galvanized bundles	65.00 to	66.00

Cleveland

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$ 59.00 to	$ 60.00
No. 2 hvy. melting	56.00 to	57.00
No. 1 dealer bundles	86.00 to	87.00
No. 1 factory bundles	87.00 to	88.00
No. 2 bundles	32.00 to	33.00
No. 1 busheling	75.00 to	76.00
Machine shop turnings	17.00 to	18.00
Shoveling turnings	17.00 to	18.00
Cast iron borings	20.00 to	21.00
Cut structural & plates, 5 ft. and under	75.00 to	76.00
Cut structural & plates, 2 ft. and under	96.00 to	97.00
Low phos. punchings plate	96.00 to	97.00
Foundry steel, 2 ft. & under	58.00 to	59.00
No. 1 RR hvy. melting	66.00 to	67.00
Rails, 2 ft. and under	95.00 to	96.00
Rails, 18 in. and under	97.00 to	98.00
No. 1 machinery cast	85.00 to	86.00
Mixed cast	52.00 to	53.00
Stainless		
18-8 bundles	435.00 to	445.00
18-8 turnings	295.00 to	305.00
430 bundles	120.00 to	130.00

Buffalo

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 55.00 to	$ 56.00
No. 2 hvy. melting	45.00 to	46.00
No. 1 busheling	75.00 to	76.00
No. 1 dealer bundles	75.00 to	76.00
No. 2 bundles	32.00 to	33.00
Machine shop turnings	13.00 to	14.00
Mixed borings and turnings	13.00 to	14.00
Shoveling turnings	19.00 to	20.00
Cast iron borings	27.00 to	28.00
Low phos. plate	78.00 to	79.00
Structural and plate, 2 ft. and under	80.00 to	81.00
Rails, 2 ft. and under	79.00 to	80.00
Scrap rails, random lgth	61.00 to	62.00
No. 1 machinery cast	75.00 to	76.00
No. 1 cupola cast	71.00 to	72.00

St. Louis

No. 1 hvy. melting	$ 72.00 to	$ 73.00
No. 2 hvy. melting	61.00 to	62.00
No. 1 busheling	86.00 to	87.00
No. 1 dealer bundles	86.00 to	87.00
No. 2 bundles	57.00 to	58.00
Machine shop turnings	15.00 to	16.00
Shoveling turnings	19.00 to	20.00
Cast iron borings	26.00 to	27.00
No. 1 RR hvy. melting	79.00 to	80.00
Rails, random length	76.00 to	77.00
Rails, 5 ft. and under	91.00 to	92.00
RR specialties	79.00 to	80.00
Cupola cast	66.00 to	67.00
Heavy breakable cast	40.00 to	41.00
Stove plate	85.00 to	86.00
Steel car wheels	85.00 to	86.00
Rerolling rails	99.00 to	100.00
Unstripped motor blocks	49.00 to	50.00

Birmingham

No. 1 hvy. melting	$ 73.00 to	$ 74.00
No. 2 hvy. melting	69.00 to	70.00
No. 1 dealer bundles	73.00 to	74.00
No. 2 bundles	49.00 to	50.00
No. 1 busheling	73.00 to	74.00
Shredder scrap	95.00 to	96.00
Machine shop turnings	25.00 to	26.00
Shoveling turnings	36.00 to	37.00
Cast iron borings	36.00 to	37.00
Electric furnace bundles	69.00 to	70.00
Elec. furnace, 3 ft. & under	75.00 to	76.00
Structural and plate, 2 ft.	92.00 to	93.00
Structural and plate, 4 ft.	83.00 to	84.00
No. 1 RR hvy. melting	83.00 to	84.00
Scrap rails, random lgth	73.00 to	74.00
Rails, 2 ft. and under	93.00 to	95.00
Angles and splice bars	83.00 to	84.00
No. 1 cupola cast	82.00 to	83.00
Unstripped motor blocks	74.00 to	75.00

Cincinnati

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 58.00 to	$ 59.00
No. 2 hvy. melting	53.00 to	54.00
No. 1 dealer bundles	80.00 to	81.00
No. 2 bundles	32.00 to	33.00
Machine shop turnings	11.00 to	12.00
Shoveling turnings	14.00 to	15.00
Cast iron borings	24.00 to	25.00
Low phos. 18 in. and under	83.00 to	84.00
Rails, random length	63.00 to	64.00
Rails, 2 ft. and under	85.00 to	86.00
No. 1 cupola cast	69.00 to	70.00
Heavy breakable cast	29.00 to	30.00
Drop broken cast	74.00 to	75.00

New York

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 38.00 to	$ 40.00
No. 2 hvy. melting	31.00 to	32.00
No. 2 dealer bundles	20.00 to	22.00
Mixed borings and turnings	10.00 to	11.00
Machine shop turnings	4.00 to	6.00
Shoveling turnings	10.00 to	12.00
Clean cast, chem. borings	35.00 to	36.00
No. 1 machinery cast	79.00 to	80.00
Mixed yard cast	50.00 to	51.00
Heavy breakable cast	10.00 to	12.00
Stainless		
18-8 prepared solids	370.00 to	390.00
18-8 turnings	270.00 to	310.00
430 prepared solids	90.00 to	100.00
430 solids	75.00 to	85.00

Boston

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 49.00 to	$ 51.00
No. 2 hvy. melting	39.00 to	41.00
No. 1 dealer bundles	53.00 to	55.00
No. 2 bundles	32.00 to	34.00
No. 1 busheling	56.00 to	58.00
Shredder scrap	59.00 to	61.00
Machine shop turnings	12.00 to	14.00
Shoveling turnings	18.00 to	20.00
No. 1 machinery cast	72.00 to	77.00
Mixed cupola cast	44.00 to	46.00
Heavy breakable cast	8.00 to	10.00

San Francisco

No. 1 hvy. melting	$ 40.00 to	$ 42.00
No. 2 hvy. melting	34.00 to	36.00
No. 1 dealer bundles	31.00 to	33.00
No. 2 dealer bundles	20.00 to	21.00
Machine shop turnings	8.00 to	9.00
Cast iron borings	8.00 to	9.00
No. 1 cupola cast	80.00 to	82.00

Los Angeles

No. 1 hvy. melting	$ 34.00 to	$ 36.00
No. 2 hvy. melting	28.00 to	30.00
No. 1 dealer bundles	26.00 to	28.00
No. 2 dealer bundles	16.00 to	18.00
Machine shop turnings	9.00 to	10.00
Shoveling turnings	10.00 to	11.00
Cast iron borings	8.00 to	9.00
Elec. furnace, 1 ft. and under (foundry)	67.00 to	69.00
No. 1 cupola cast	72.00 to	74.00

Seattle

No. 1 hvy. melting	$ 60.00 to	$ 62.00
No. 2 hvy. melting	51.00 to	53.00
No. 2 bundles	35.00 to	37.00
No. 1 cupola cast	89.00 to	90.00
Mixed yard cast	80.00 to	82.00

Hamilton, Ont.

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 74.00
No. 2 hvy. melting, cut 2 ft. and under	66.00
No. 1 dealer bundles	82.00
No. 2 bundles	58.00
Mixed steel scrap	53.00
Bush. new fact. prep'd	77.00
Bush. new fact. unprep'd	60.00
Machine shop turnings	30.00
Short steel turnings	30.00
Mixed borings and turning	19.00
Cast scrap	97.00

Houston

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 64.00 to	$ 65.00
No. 2 hvy. melting	54.00 to	55.00
No. 2 bundles	33.00 to	34.00
Machine shop turnings	13.00 to	14.00
Crushed turnings	23.00 to	24.00
Shredder scrap	75.00 to	76.00
Cut structural plate, 2 ft. and under	89.00 to	90.00
Cut structural plate, 5 ft. and under	74.00 to	75.00
Unstripped motor blocks	52.00 to	53.00
Cupola cast	83.00 to	84.00

1986 WAS A YEAR OF PRICE DEFLATION

Prices of producers' finished goods were unchanged in December from the month before.

That's the way it has been for a long time now; prices remaining stagnant, or actually falling.

The 'no change' price situation in December followed four months of modest increases. And, for the full year 1986, finished goods prices moved down 2.5 pct.

Too, the price decline last year followed increases of less than 2 pct in each of the three preceding years.

Importantly, tags on capital equipment were right in line with the overall pattern in December; they were unchanged from November. This is clearly shown on the table here.

Why such a soft price year?

Janet Norwood, commissioner of the Bureau of Labor Statistics, cited "dramatic cuts in prices for energy goods" as the "driving force" behind price softness last year.

She noted recent firming in prices for energy goods but added, "I doubt that this development threatens to reaccelerate inflation to double-digit levels in the immediate future."

The commissioner further noted that even with energy goods prices excluded, there existed a "continuing very moderate underlying rate of inflation" last year. Prices for finished goods outside the volatile food and energy sectors rose by less than 3 pct for the fourth consecutive year.

Commissioner Norwood also pointed to the other side of the coin on lower prices.

"Falling prices have constituted a major problem," she explained, "while profit margins for some manufacturing concerns are being seriously restrained by intense foreign competition."

Latest Month Covered: December 1986

Products	Index Reading For Month (1967 = 100)	Pct Change From Previous Month	Pct Change From Year-Ago Month
Metal Cutting Machine Tools	408.2	+ 0.1	+ 3.2
Metal Forming Machine Tools	442.2	− 0.2	+ 1.2
Agricultural Machinery & Equip.	340.0	− 0.1	+ 0.6
Construction Machinery & Equip.	370.7	+ 0.2	+ 2.0
Oil and Gas Field Machinery	410.5	+ 0.1	− 3.5
Industrial Material Handling Equip.	297.7	+ 0.2	+ 0.8
Pumps, Compressors & Allied Equip.	363.9	− 0.2	+ 2.2
Mining Machinery & Equipment	331.3	− 0.1	− 0.1
Mechanical Power Transmission Equip.	349.3	0	+ 3.3
Automobiles	247.7	− 0.7	+ 6.6
Motor Trucks—Light	324.0	− 2.0	+ 3.7
Motor Trucks—Heavy	348.2	+ 0.1	+ 3.8
Railroad Equipment	364.5	0	0
Fabricated Metal Structural Products	316.8	− 0.3	+ 0.6
Electric Motors	352.6	− 0.1	+ 0.4
Valves & Fittings (Dec. 1982 = 100)	107.4	+ 0.1	+ 1.5
Ball & Roller Bearings	355.7	− 0.2	+ 0.7
Foundry & Forge Shop Products	363.3	+ 0.5	− 0.1
Heating Equipment	271.7	+ 0.1	+ 3.7
Plumbing Fixtures & Brass Fittings	322.2	− 0.2	+ 2.4
Metal Containers	362.5	0	+ 0.4
Internal Combustion Engines	353.8	0	+ 1.9

Data based on U.S. Labor Dept.'s Producer Price Index

RON AGE MARCH 1987

MANUFACTURING MANAGEMENT

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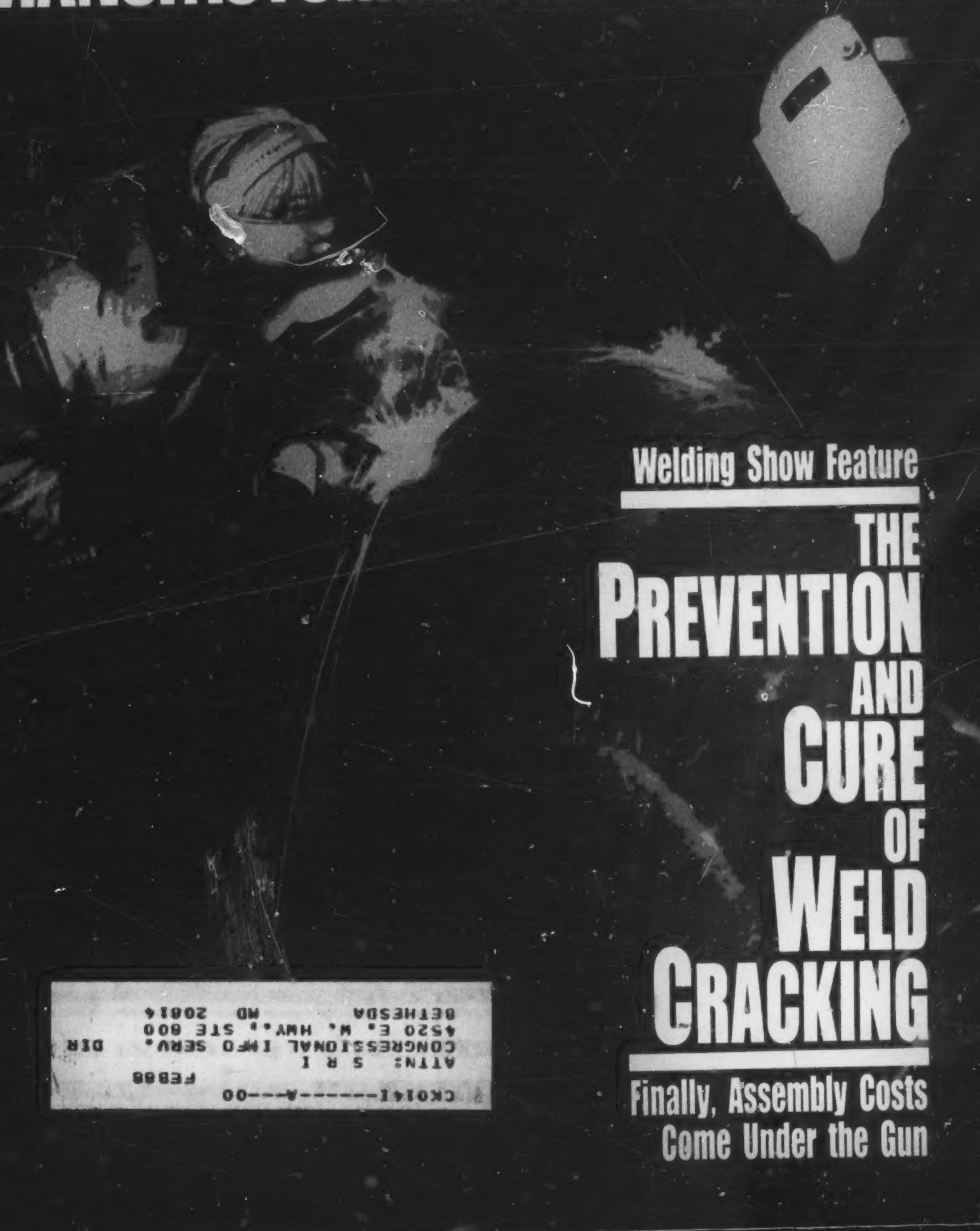

Welding Show Feature

THE PREVENTION AND CURE OF WELD CRACKING

Finally, Assembly Costs Come Under the Gun

CK0141------A---00 FE888
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CONGRESSIONAL INFO SERV. DIR
4520 E. W. HWY., STE 800
BETHESDA MD 20814

IRON AGE
MANUFACTURING MANAGEMENT

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Advanced Materials: New Tools for Alloy Developers

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MATERIALS PRICES

PRICE & PRODUCTION DATA

(Effective February 2, 1987)

Steel production by districts, thousands of tons (000 omitted)

	Last Week	Two Weeks Ago	Month Ago	Year Ago
Northeast Coast	119	135	131	179
Pittsburgh	170	171	180	206
Youngstown	110	111	105	112
Lake Erie	111	109	105	130
Detroit	150	150	150	141
Chicago	337	334	335	509
Midwest	163	156	159	172
Southern	138	138	144	227
Western	39	39	40	87
U.S. Production	1,337	1,343	1,349	1,763

Source: American Iron & Steel Institute

Lake Superior Ore Prices

51.50% Fe Natural delivered lower Lake ports unless otherwise stated. Rail transportation, handling and unloading may be charged to buyer. Coarse ore 80¢ premium.

Pellets (per iron unit natural)	gross-ton 58.0*
Pellets (per iron unit natural)	gross-ton 59.4**
Pellets (per iron unit natural)	gross-ton 72.45-86.9***
Mesabi, regular-unscreened	gross-ton 32.53
Mesabi, non-bessemer	gross-ton 30.03-31.53

*58.0¢—Mineral Services, Inc. as of 8/13/85. **59.4¢—Inland Steel Mining, 1/1/85 and Pickands Mather, 8/1/85, delivered hold of vessel upper Lake ports. ***72.5¢—U.S. Steel as of 8/16/85. 86.9¢—Oglebay Norton 3/25/82. Hanna Mining and Cleveland Cliffs, 2/26/82

STEEL PRODUCTION, COMPOSITE PRICES

(Effective February 2, 1987)

U.S. Steel Production	Last Week	Two Weeks Ago	To Date 1986	To Date 1985
Net tons, in thousands	1,337	1,343	5,934	7,647
Capability Utilization Rate	58.4	58.7	58.6	69.2

Composite Prices	This Week	Week Ago	Month Ago	Year Ago
Finished Steel Base* (¢/lb.—eff. 1/4/87)	25.236	25.236	24.951	24.607
Pig Iron** (Net ton=2000 lbs.)	$213.00	$213.00	$213.00	$213.00
Scrap No. 1 hvy.*** (Gross ton=2240 lbs.)	$ 77.50	$ 75.83	$ 76.50	$ 75.50
No. 2 bundles	$ 51.17	$ 51.17	$ 52.17	$ 53.83

Scrap Comparison (Gross Ton)				
No. 1 steel, Pittsburgh	$ 82.50	$ 79.50	$ 79.50	$ 76.50
No. 1 steel, Philadelphia	71.50	69.50	71.50	72.50
No. 1 steel, Chicago	78.50	78.50	78.50	77.50
No. 1 bundles, Detroit	85.50	85.50	80.50	70.50
Low Phos., Youngstown	82.50	79.50	79.50	76.50
No. 1 mach'y cast., Pgh	74.50	74.50	74.50	68.50
No. 1 mach'y cast., Phila	93.50	93.50	93.50	92.50
No. 1 mach'y cast., Chi	101.50	101.50	101.50	109.50

*Finished Steel Composite: Weighted index of steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

**Pig Iron Composite: Based on average prices for basic and foundry pig iron at representative producing points within the U.S.

***Steel Scrap Composite: Average of No. 1 hvy. melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

NONFERROUS PRICES

(Effective February 2, 1987) Prices obtained in trade based on representative tonnages per gross ton delivered to consumer unless otherwise stated.

Primary Metal Prices

(cents per lb.)	current price	last price	date of change
Aluminum (LME)	54.60	52.80	2/2/87
Copper (C)	64.50	64.00	1/26/87
Lead	26.00	27.00	2/2/87
Magnesium Ingot	153.00	148.00	12/9/85
Nickel (LME)	167.00	162.00	1/26/87
Zinc	47.00	44.50	10/6/86

ALUMINUM: Avg. for last week & previous week. COPPER (C)=cathode. LEAD: common grade. MAGNESIUM: 99.8% pig delivered. NICKEL: Avg. for last week & previous week. ZINC: high grade.

Antimony, American Laredo, Texas	$2.00
Beryllium-aluminum 5% Be, per lb. contained Be	$248.00
Beryllium-copper, per lb. cont. Be	$152.00
Beryllium 97% powder 200	$229.00
Cadmium, ton lots	$1.50
Calcium, ton lots, crown	$3.92
Chromium, 99.5% electro	$4.62
Cobalt, 99%, cathode	$12.50
Gold, per troy oz	$420.00
Indium, per troy oz.	$2.87
Iridium, per troy oz.	$411.00
Magnesium sticks, 10,000 lbs.	$2.02
Mercury, per 76-lb., f.o.b. N.Y.	$212.00-225.00
Molybdenum, lb. tech. moly oxides, 20 lb. MO con.	$3.45
Palladium, per troy oz.	$124.00
Platinum, per troy oz.	$529.00
Rhodium, per troy oz	$1,162.00
Silver ingots, per troy oz	$5.51
Titanium sponge, melt grade	$3.40-3.55
Tungsten powder, hyd red	$9.53-9.85
Vanadium	$6.00
Zirconium sponge	$11.00-17.00

(Per lb. unless otherwise noted)

Straits Tin Price

(U.S. cents per lb. EX-SMELTER based on daily market in Kuala Lumpur in Malaysian dollars per kilo.)

January 26—301.00
January 27—301.00
January 28—302.00
January 29-Holiday
January 30-Holiday

Scrap Prices
Brass Mill Scrap

(Cents per lb., over 20,000 lbs. add 1¢ per lb.)

	Solids	**Turnings**
Copper	55½	50½
Yellow brass	48	47½
Red brass	49	45
Comm. bronze	50½	45½
Mang. bronze	38½	37½
Free cutting rod ends	47	46

Custom Smelters Scrap

(Cents per lb., carload lots, del. refinery)

No. 1 copper wire	54
No. 2 copper wire	46
light copper	40

Ingot Makers Scrap

(Cents per lb., carload lots, del. refinery)

No. 1 copper wire	48
No. 2 copper wire	39
light copper	32
No. 1 composition	41
No. 1 comp. turnings	41
Hvy. yellow brass solids	28
Hvy. yellow brass turnings	23
Radiators	26

Aluminum

New mixed clips	32	— 33
Old sheet	29	— 30
Old cast	29	— 30
Clean dry borings	30	— 31

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Aluminum

Segregated clippings	28	— 29
Mixed L.C. clips	26	— 27
Old sheets and cast	23	— 24
Borings and turnings	19	— 20
Duraluminum clippings	24	— 25

Copper and Brass

No. 1 copper wire	43	— 46
No. 2 copper wire	34	— 35
light copper	31	— 32
Radiators	21	— 22
No. 1 composition	35	— 36
No. 1 composition turnings	33	— 34
Cocks and faucets	29	— 30
Clean heavy yellow brass	25	— 27
Brass pipe	25	— 26
New soft brass clippings	38	— 39

Lead

Heavy soft lead	8	— 9
Whole batteries	1	— 2
Type metal	17	— 18
Electrotype	14	— 15

Nickel

Nickel solids	100	—110
Nickel rod ends	100	—110
Nickel sheets, clips	100	—110
Nickel turnings	25	— 35

Zinc

New zinc clippings	14	— 15
Old diecast zinc	10	— 11

EFFECTIVE FEBRUARY 2, 1987

(Effective February 2, 1987) Prices obtained in trade based on representative tonnages per gross ton delivered to consumer unless otherwise stated. Prices are the opinions of Iron Age editors and correspondents, based on contacts with dealers, brokers, generators and users in the industry on the effective date listed above.

Ferrous Scrap Prices

Pittsburgh

No. 1 hvy. melting	$ 82.00 to	$ 83.00
No. 2 hvy. melting	72.00 to	73.00
No. 1 dealer bundles	104.00 to	105.00
No. 1 factory bundles (auto)	107.00 to	108.00
No. 2 bundles	45.00 to	46.00
No. 1 busheling	104.00 to	105.00
Machine shop turnings	8.00 to	9.00
Shoveling turnings	46.00 to	47.00
Cast iron borings	45.00 to	46.00
Low phos. punchings plate	107.00 to	108.00
Heavy turnings	72.00 to	73.00
No. 1 RR hvy. melting	86.00 to	87.00
Rails, 2 ft. and under	98.00 to	99.00
Scrap rails, random lgth	86.00 to	87.00
RR specialties	99.00 to	100.00
No. 1 machinery cast	74.00 to	75.00
Cupola cast	67.00 to	68.00
Heavy breakable cast	30.00 to	31.00
Stainless		
18-8 bundles and solids	475.00 to	485.00
18-8 turnings	375.00 to	385.00

Chicago

No. 1 hvy. melting	$ 78.00 to	$ 79.00
No. 2 hvy. melting	74.00 to	75.00
No. 1 dealer bundles	99.00 to	100.00
No. 1 factory bundles (auto)	102.00 to	103.00
No. 2 dealer bundles	62.00 to	63.00
No. 1 busheling	89.00 to	90.00
Shredder scrap	83.00 to	84.00
Machine shop turnings	24.00 to	25.00
Mixed borings and turnings	16.00 to	17.00
Shoveling turnings	25.00 to	26.00
Cast iron borings	40.00 to	41.00
Low phos. forge crop	95.00 to	96.00
Low phos. punchings plate 1/4 in. and heavier	115.00 to	116.00
Low phos. 2 ft. and under	108.00 to	109.00
No. 1 RR hvy. melting	82.00 to	83.00
Scrap rails random lgth	79.00 to	80.00
Rerolling rails	100.00 to	101.00
Rails, 2 ft. and under	94.00 to	95.00
RR couplers and knuckles	79.00 to	80.00
RR car axles	104.00 to	105.00
No. 1 machinery cast	101.00 to	102.00
Cupola cast	89.00 to	90.00
Stove plate	99.00 to	100.00
Steel car wheels	85.00 to	86.00
Stainless		
18-8 bundles and solids	450.00 to	460.00
18-8 turnings	350.00 to	360.00
430 bundles and solids	125.00 to	135.00
430 turnings	85.00 to	95.00

Philadelphia

No. 1 hvy. melting	$ 70.00 to	$ 73.00
No. 2 hvy. melting	62.00 to	65.00
No. 1 dealer bundles	86.00 to	89.00
No. 2 dealer bundles	44.00 to	47.00
No. 1 busheling	83.00 to	86.00
Shredder scrap	84.00 to	87.00
Machine shop turnings	24.00 to	27.00
Mixed borings and turnings	24.00 to	27.00
Shoveling turnings	39.00 to	42.00
Low phos. 5 ft. and under	72.00 to	75.00
Low phos. 2 ft. punchings	91.00 to	94.00
Electric furnace bundles	99.00 to	100.00
RR specialties	80.00 to	83.00
Rails, 2 ft. and under	96.00 to	99.00
Cupola cast	80.00 to	83.00
Heavy breakable cast	52.00 to	55.00
No. 1 machinery cast	92.00 to	95.00

Detroit

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 54.00 to	$ 55.00
No. 2 hvy. melting	53.00 to	54.00
No. 1 dealer bundles	85.00 to	86.00
No. 2 bundles	41.00 to	42.00
No. 1 busheling	83.00 to	84.00
Drop forge flashings	44.00 to	45.00
Machine shop turnings	24.00 to	25.00
Mixed borings and turnings	6.00 to	7.00
Shoveling turnings	24.00 to	25.00
Cast iron borings	21.00 to	22.00
Heavy breakable cast	32.00 to	33.00
Mixed cupola cast	47.00 to	48.00
Automobile cast	71.00 to	72.00
Stainless		
18-8 bundles and solids	430.00 to	440.00
18-8 turnings	290.00 to	300.00
430 bundles and solids	115.00 to	125.00

Youngstown

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 66.00 to	$ 67.00
No. 2 hvy. melting	63.00 to	64.00
No. 1 dealer bundles	89.00 to	90.00
No. 2 dealer bundles	45.00 to	46.00
Machine shop turnings	18.00 to	19.00
Shoveling turnings	18.00 to	19.00
Low phos. plate	82.00 to	83.00
Electric furnace bundles	73.00 to	74.00
Galvanized bundles	70.00 to	71.00

Cleveland

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 62.00 to	$ 63.00
No. 2 hvy. melting	59.00 to	60.00
No. 1 dealer bundles	91.00 to	92.00
No. 1 factory bundles	92.00 to	93.00
No. 2 bundles	34.00 to	35.00
No. 1 busheling	80.00 to	81.00
Machine shop turnings	17.00 to	18.00
Shoveling turnings	17.00 to	18.00
Cast iron borings	20.00 to	21.00
Cut structural & plates, 5 ft. and under	79.00 to	80.00
Cut structural & plates, 2 ft. and under	99.00 to	100.00
Low phos. punchings plate	99.00 to	100.00
Foundry steel, 2 ft. & under	60.00 to	61.00
No. 1 RR hvy. melting	68.00 to	69.00
Rails, 2 ft. and under	100.00 to	101.00
Rails, 18 in. and under	102.00 to	103.00
No. 1 machinery cast	85.00 to	86.00
Mixed cast	52.00 to	53.00
Stainless		
18-8 bundles	435.00 to	445.00
18-8 turnings	295.00 to	305.00
430 bundles	120.00 to	130.00

Buffalo

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 57.00 to	$ 58.00
No. 2 hvy. melting	47.00 to	48.00
No. 1 busheling	81.00 to	82.00
No. 1 dealer bundles	81.00 to	82.00
No. 2 bundles	32.00 to	33.00
Machine shop turnings	13.00 to	14.00
Mixed borings and turnings	13.00 to	14.00
Shoveling turnings	19.00 to	20.00
Cast iron borings	27.00 to	28.00
Low phos. plate	82.00 to	83.00
Structural and plate, 2 ft. and under	84.00 to	85.00
Rails, 2 ft. and under	81.00 to	82.00
Scrap rails, random lgth	63.00 to	64.00
No. 1 machinery cast	76.00 to	77.00
No. 1 cupola cast	71.00 to	72.00

St. Louis

No. 1 hvy. melting	$ 74.00 to	$ 75.00
No. 2 hvy. melting	61.00 to	62.00
No. 1 busheling	88.00 to	89.00
No. 1 dealer bundles	89.00 to	90.00
No. 2 bundles	57.00 to	58.00
Machine shop turnings	17.00 to	18.00
Shoveling turnings	21.00 to	22.00
Cast iron borings	26.00 to	27.00
No. 1 RR hvy. melting	83.00 to	84.00
Rails, random length	76.00 to	77.00
Rails, 5 ft. and under	91.00 to	92.00
RR specialties	83.00 to	84.00
Cupola cast	66.00 to	67.00
Heavy breakable cast	40.00 to	41.00
Stove plate	85.00 to	86.00
Steel car wheels	85.00 to	86.00
Rerolling rails	99.00 to	100.00
Unstripped motor blocks	49.00 to	50.00

Birmingham

No. 1 hvy. melting	$ 73.00 to	$ 74.00
No. 2 hvy. melting	69.00 to	70.00
No. 1 dealer bundles	73.00 to	74.00
No. 2 bundles	49.00 to	50.00
No. 1 busheling	73.00 to	74.00
Shredder scrap	95.00 to	96.00
Machine shop turnings	28.00 to	29.00
Shoveling turnings	39.00 to	40.00
Cast iron borings	36.00 to	37.00
Electric furnace bundles	69.00 to	70.00
Elec. furnace, 3 ft. & under	75.00 to	76.00
Structural and plate, 2 ft.	94.00 to	95.00
Structural and plate, 4 ft.	86.00 to	87.00
No. 1 RR hvy. melting	86.00 to	87.00
Scrap rails, random lgth	80.00 to	81.00
Rails, 2 ft. and under	97.00 to	98.00
Angles and splice bars	86.00 to	87.00
No. 1 cupola cast	82.00 to	83.00
Unstripped motor blocks	74.00 to	75.00

Cincinnati

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 60.00 to	$ 61.00
No. 2 hvy. melting	53.00 to	54.00
No. 1 dealer bundles	85.00 to	86.00
No. 2 bundles	32.00 to	33.00
Machine shop turnings	11.00 to	12.00
Shoveling turnings	14.00 to	15.00
Cast iron borings	24.00 to	25.00
Low phos. 18 in. and under	85.00 to	86.00
Rails, random length	65.00 to	66.00
Rails, 2 ft. and under	85.00 to	86.00
No. 1 cupola cast	69.00 to	70.00
Heavy breakable cast	29.00 to	30.00
Drop broken cast	74.00 to	75.00

New York

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 38.00 to	$ 40.00
No. 2 hvy. melting	31.00 to	32.00
No. 2 dealer bundles	20.00 to	22.00
Mixed borings and turnings	10.00 to	11.00
Machine shop turnings	4.00 to	6.00
Shoveling turnings	10.00 to	12.00
Clean cast, chem. borings	35.00 to	36.00
No. 1 machinery cast	79.00 to	80.00
Mixed yard cast	50.00 to	51.00
Heavy breakable cast	10.00 to	12.00
Stainless		
18-8 prepared solids	370.00 to	390.00
18-8 turnings	270.00 to	310.00
430 prepared solids	90.00 to	100.00
430 solids	75.00 to	85.00

Boston

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 49.00 to	$ 51.00
No. 2 hvy. melting	39.00 to	41.00
No. 1 dealer bundles	53.00 to	55.00
No. 2 bundles	32.00 to	34.00
No. 1 busheling	56.00 to	58.00
Shredder scrap	59.00 to	61.00
Machine shop turnings	12.00 to	14.00
Shoveling turnings	18.00 to	20.00
No. 1 machinery cast	72.00 to	77.00
Mixed cupola cast	44.00 to	46.00
Heavy breakable cast	8.00 to	10.00

San Francisco

No. 1 hvy. melting	$ 40.00 to	$ 42.00
No. 2 hvy. melting	34.00 to	36.00
No. 1 dealer bundles	31.00 to	33.00
No. 2 dealer bundles	20.00 to	21.00
Machine shop turnings	8.00 to	9.00
Cast iron borings	8.00 to	9.00
No. 1 cupola cast	80.00 to	82.00

Los Angeles

No. 1 hvy. melting	$ 34.00 to	$ 36.00
No. 2 hvy. melting	28.00 to	30.00
No. 1 dealer bundles	26.00 to	28.00
No. 2 dealer bundles	16.00 to	18.00
Machine shop turnings	9.00 to	10.00
Shoveling turnings	10.00 to	11.00
Cast iron borings	8.00 to	9.00
Elec. furnace, 1 ft. and under (foundry)	67.00 to	69.00
No. 1 cupola cast	72.00 to	74.00

Seattle

No. 1 hvy. melting	$ 60.00 to	$ 62.00
No. 2 hvy. melting	51.00 to	53.00
No. 2 bundles	35.00 to	37.00
No. 1 cupola cast	89.00 to	90.00
Mixed yard cast	80.00 to	82.00

Hamilton, Ont.

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 74.00
No. 2 hvy. melting, cut 2 ft. and under	66.00
No. 1 dealer bundles	82.00
No. 2 bundles	58.00
Mixed steel scrap	53.00
Bush. new fact. prep'd	77.00
Bush. new fact. unprep'd	60.00
Machine shop turnings	30.00
Short steel turnings	30.00
Mixed borings and turning	19.00
Cast scrap	97.00

Houston

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 64.00 to	$ 65.00
No. 2 hvy. melting	54.00 to	55.00
No. 2 bundles	33.00 to	34.00
Machine shop turnings	13.00 to	14.00
Crushed turnings	23.00 to	24.00
Shredder scrap	75.00 to	76.00
Cut structural plate, 2 ft. and under	89.00 to	90.00
Cut structural plate, 5 ft. and under	74.00 to	75.00
Unstripped motor blocks	52.00 to	53.00
Cupola cast	83.00 to	84.00

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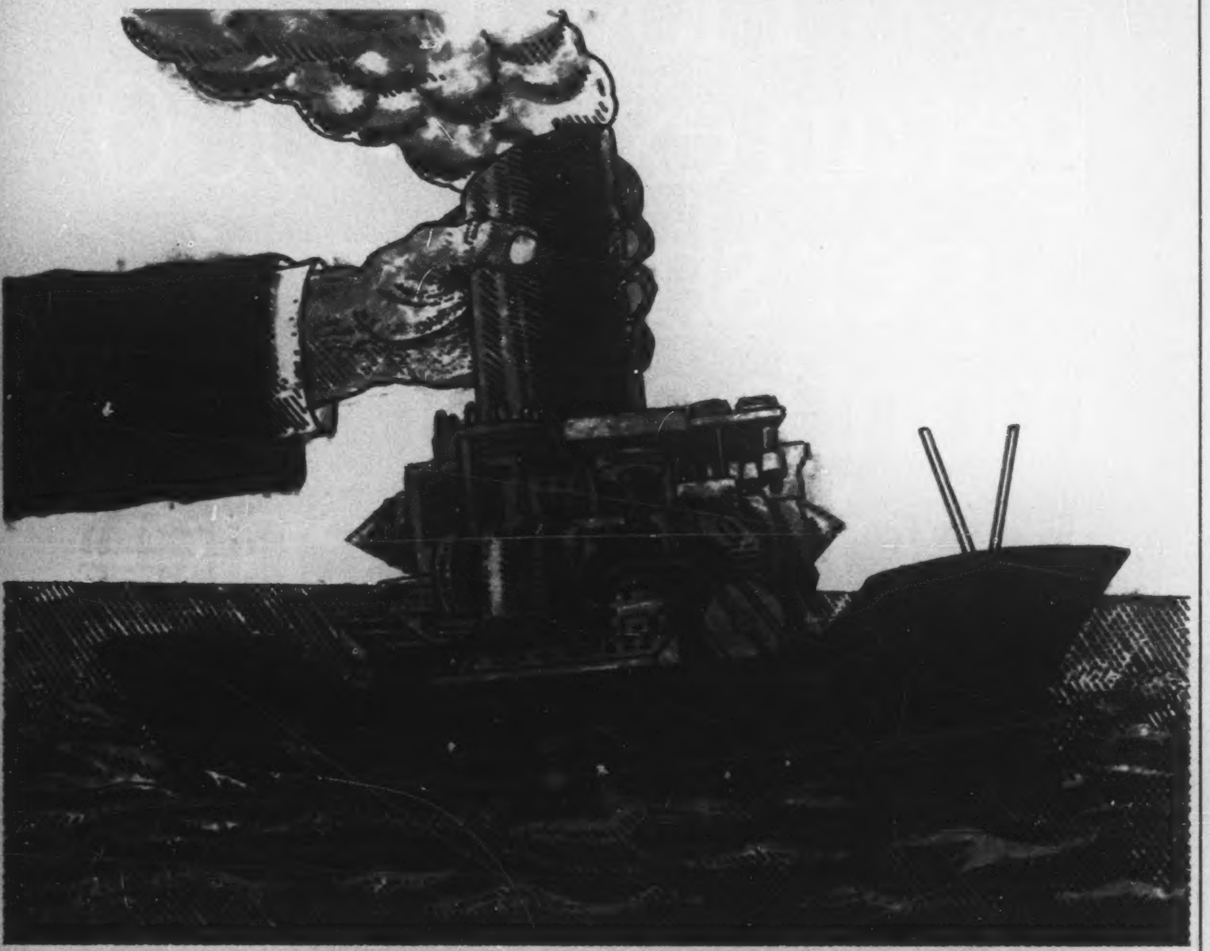


WILL TRADE PACTS HELP MACHINE TOOL BUILDERS?

Though the Commerce Department says the restraint agreements will bolster the U.S. builders' share of the market, few in industry see little improvement in orders this year.

Even though it took years to win its fight against imports, the domestic machine tool industry shouldn't expect any immediate miracles from the Reagan Administration's new limits on foreign machine tools, financial experts contend.

And, industry observers contend the domestic machine tool builders are going to have major problems because of the Tax Reform Act of 1986 and a stagnant market for machine tools.

Voluntary Restraint Agreements (VRAs) on machine tool imports from Japan and Taiwan and import restrictions on machine tools from Switzerland and West Germany were announced late last year with much fanfare by the U.S. Department of Commerce and the White House. That action came after years of lobbying by domestic machine tool interests, and months of inside fighting by members of the Reagan Administration.

Essentially, representatives of the machine tool industry wanted imports rolled back to the levels of the early 1980s because foreign machine tools continued to capture larger shares of the U.S. market and posed a real threat to the continued profitability of the domestic industry. To force action on the issue, several years ago the domestic industry filed formal pe-

Fewer Machine Tools From the Far East. . .

Japan

	1985	1986*	1987	Net Change**	Pct Change
NC Lathes	3691	3835	3592	−243	−6.3
Non-NC Lathes	437	719	359	−360	−50.1
Mach. Centers	3735	3389	2436	−953	−28.1
Milling Mach.	4852	333	476	+143	+42.9
NC P&S	424	415	146	−269	−64.8
Non-NC P&S	421	449	450	+1	+0.2
Total	9190	9140	7459	−1681	−18.4

Taiwan

NC Lathes	180	504	202	−302	−59.9
Non-NC Lathes	2766	2355	1842	−513	−21.8
Mach. Centers	238	348	220	−128	−36.8
Milling Mach.	3929	3083	2915	−168	−5.4
Total	7113	6290	5179	−1111	−17.7

. . . But Little Change in Imports From Europe

West Germany

	1985	1986*	1987	Net Change**	Pct Change
NC Lathes	150	180	169	−11	−6.1
Non-NC Lathes	311	171	255	+84	+49.1
Mach. Centers	81	127	75	−52	−40.9
NC P&S	33	40	25	−15	−37.5
Non-NC P&S	453	385	389	+4	+1.0
Total	1028	903	913	+10	+1.1

Switzerland

NC-P&S	72	56	55	−1	−1.8

Source: U.S. Commerce Dept.

* Annualized nine months 1986 figures
** Net change from 1986 to 1987

titions with the government to limit those imports.

Meanwhile, the real battle within the Reagan Administration started in late 1985, when some officials became alarmed because machine tool imports rose from 26.4 pct to 43 pct of the U.S. market in only a few years.

They were worried about the national security problems with a feeble U.S. machine tool industry if the country fought a long term war. They were also worried about the shrinking industrial base of the defense industry at a time when Japanese machine tool makers had tripled their U.S. market from $535 million to $1.5 billion, and Taiwanese and European manufacturers were also getting larger shares of the U.S. market.

Facing those national security problems, Commerce Secretary Malcolm Baldrige and Defense Secretary Caspar Weinberger teamed up to push the idea of forcing a cutback of 90 pct of foreign machine tools to keep the U.S. industry ready to meet a national emergency. However, they soon ran up against U.S. Trade Representative Clayton Yeutter and other ardent free traders in the Administration, and President Reagan was convinced to take a softer position.

In the end, U.S. trade negotiators threatened the Japanese and Taiwanese with 25-year-old Federal trade laws to cut back the imports, and those governments made some concessions on their machine tool exports.

The final agreement itself was complex, but a Commerce Department report breaks it down into these main components:

•First, the department found that imports represented a threat to U.S. national security in seven of 18 machine tool product categories. Specifically, it mentioned imports of machining centers, vertical numerically controlled lathes, horizontal numerically controlled (NC) lathes, non-numerically controlled (non-NC) lathes, milling machines, and numerically controlled and non-numerically controlled punching and shearing machines.

•Based on these findings, specific agreements were reached in each of the seven product categories. For example, the Japanese agreed to 1987 market levels of 7,459 units, including: 3,592 NC lathes, 359 non-NC lathes, 2,436 machining centers, 476 milling machines, 146 NC punching and shearing machines, and 450 non-NC punching and shearing machines.

•For Taiwan, the 1987 market levels will be a total of 5,179 units, including: 202 NC lathes, 1,842 non-NC lathes, 2,915 milling machines, and 220 machining centers.

•Meanwhile, the restraints placed on West Germany would allow that country to export only 913 units to the U.S., including: 389 non-NC punching and shearing machines, 169 NC lathes, 255 non-NC lathes, 75 machining centers, and 25 NC punching and shearing machines.

•In a much smaller category, the department reported that Switzerland had agreed to send only 55 NC punching and shearing machines.

In addition to those agreements, Commerce officials told several other countries not to try to fill the void left by the import restrictions. While the department did not officially announce those countries, the American Machine Tool Distributors' Association (AMTDA) said the countries are believed to be Great Britain, Spain, Italy, Sweden, Brazil, South Korea, and Singapore.

Japan and Taiwan

While making optimistic predictions about the effect of these restrictions, the Commerce Department noted that the two biggest exporters to the U.S., Japan and Taiwan, agreed to limit their exports for five years, beginning this January. And, it said, the combined effect of those restrictions could create for U.S. machine tool makers new market opportunities of about 3,300 units this year. In 1985, those machines were imported at a value of about $155 million.

In addition, the department said, over the next five years of import restrictions, U.S. machine tool makers could increase domestic sales by about 16,500 units, and the imported values of these machines would be $775 million.

In a letter to its membership, AMTDA said of the Commerce Department's projections: "These additional sales would represent an overall market share increase of 35 pct to 44 pct for this portion of the U.S. machine tool industry. The Department of Commerce also believes that the VRAs will preserve employment in the U.S. machine tool industry."

It added, "If the industry continued to lose jobs at its current rate, it would lose about 10,700 workers over the next five years. The VRAs will help ensure that jobs remain in the U.S. The Department of Commerce also believes that increases in the capacity utilization and additional revenues of the U.S. machine tool industry would permit more investment in research development and research facilities. The Commerce Department estimated that new investments in plant and equipment could total $150 million over the five-year period."

In announcing the agreements, President Reagan was optimistic, saying, "The revitalization of the domestic machine tool industry is primarily the industry's own responsibility. However, for national security purposes, the government has a role in facilitating the industry's recovery effort."

Mr. Reagan noted that Japan and Taiwan voluntarily agreed to reduce their imports to the U.S. for five years, while the U.S. had to place limits on the imports from Switzerland and West Germany.

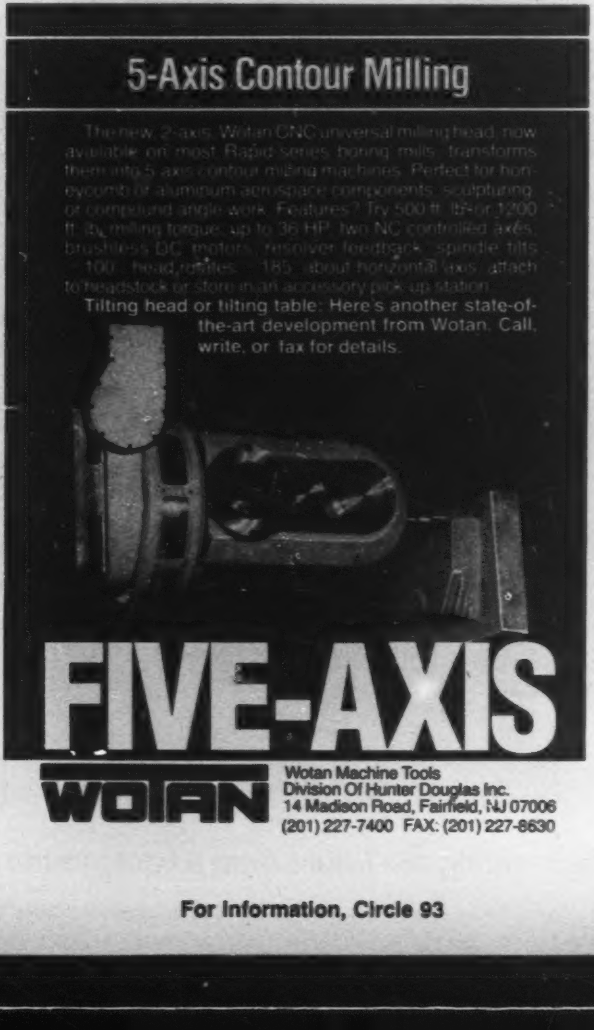
Regarding those European nations, Mr. Reagan said, "I have directed the Department of Commerce and the U.S. Customs Service to monitor machine tool imports to determine whether these limits are being exceeded. If we determine that exports of these machine tools exceed these limits and undermine the integrity of the machine tool revitalization program, I am prepared to take unilateral action under U.S. law."

And, Mr. Reagan also outlined these additional steps to help the domestic industry:

•Requiring the Defense Department to work with the Commerce Department to "help integrate the domestic industry more fully into the defense procurement process by providing the industry with more timely information about defense programs and future procurement requirements."

•Linking the domestic industry with defense programs "to improve manufacturing technology," providing up to $5 million in Defense Department funds for research on manufacturing, and then sharing that research with companies in the industry.

•And, Mr. Reagan promised to develop a special training pro-



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However, despite those predictions, the Commerce Department also furnished other figures that showed restricting the imports would not be as sweeping an action as the President and his cabinet officers had indicated.

For example, in 1986 the Japanese sent an estimated 9,140 units to the U.S., and that would drop to the 7,459 units this year. That was a total decrease of 18.4 pct not nearly in the range of the 90 pct first advocated by Secretary Baldrige. And, while the Japanese had agreed to reduce their exports of machining centers to the U.S. by 953, the agreement also called for allowing that nation to boost its exports of milling machines by 143.

The reductions for Taiwan followed a similar pattern, dropping from an estimated 6,290 units in 1986 to the 5,179 machine tools this year, a decrease of 17.7 pct.

In addition, although West Germany must cut back its machining centers sent to the U.S. by 40.9 pct this year, it would also be allowed to ship 49.1 pct more non-NC lathes. In this case, the net result is that West Germany's machine tool exports to this country will actually grow from 903 in 1986 to 913 this year, a boost of 1.1 pct. Meanwhile, the imports from Switzerland will have a minimal impact since that country sent the U.S. 56 machine tools last year and can send 55 this year, a decrease of 1.8 pct.

Little Impact

In the weeks since these measures were announced, industry experts have been analyzing them for their impact on domestic machine tool makers.

One industry economist who studied the situation came to this conclusion: "Despite all the talk, this isn't going to have a major impact on the U.S. industry. Those reductions will help, but they won't turn the industry

Foreign Builders Take a Big Slice of a Smaller Pie

Machine tool orders for January fell 23 pct to $147.8 million from $190.8 million in January 1986, according to the National Machine Tool Builders' Association (NMTBA).

January orders for lathes, milling machines, machining centers, grinders, boring mills and other machinery used to shape metal by cutting totaled $99.9 million, down 26 pct from $135 million a year earlier, NMTBA reported last month. That broke down to $88 million in those orders for domestic machine tools and $11.9 million for foreign products.

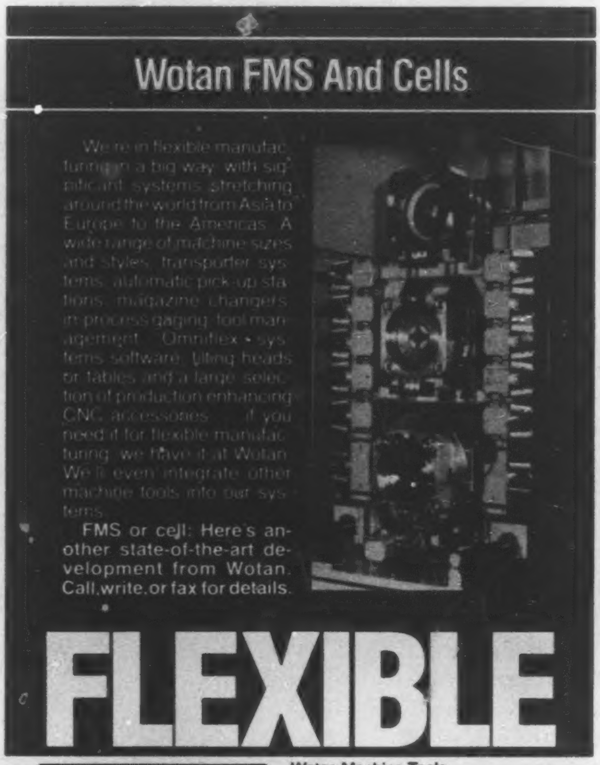
Meanwhile, orders in December were $87.2 million, with domestic manufacturers getting $74 million of business and the foreign market taking $13.2 million.

A year earlier, the domestic market was $124.75 million, while the foreign market totaled $10.25 million.

Orders in January for metalforming presses and other machinery used to shape metal with pressure totaled $47.9 million, which was 14 pct below the $55.8 million of January 1986, the trade group also reported.

The domestic market for metalforming machine tools was $33 million in January, with foreign competition getting $14.85 million. In January 1986, the domestic industry got $50.2 milion in those orders, while foreign competition received orders for $5.5 million of the products.

The January figures in this segment of the market were slightly below the $49.3 million in orders received in December, with U.S. manufacturers getting $37 million in new business and foreign machine tool companies with $12.25 million in new business.



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For Information, Circle 94

around. Only a major surge in manufacturing will do that."

At the same time, a company spokesman for Cincinnati Milacron, Inc., would say only that the company hoped the VRAs would be beneficial for the machine tool industry, but it was too early to make more specific predictions.

Eli Lustgarten, an industry analyst with Paine Webber, discounted a major impact from the import limits, saying, "The real problem with the machine tool industry is a lack of demand."

Current demand for machine tools is very much lower than in 1980 or 1981, he said, and on a worldwide basis there is a large inventory of unsold machine tools.

As for the immediate effect of the import limits, he said it was "too early to tell," and that there was a potential shrinkage of the machine tool market for the latter part of this year and into 1988. Demand might improve, he said, toward the end of the decade.

While the import limitations made a political splash in Washington, Ralph Nappi, AMTDA's director of management services, said his association's membership is taking a wait-and-see attitude about how they will affect the domestic machine tool distribution business.

He said the trade group's members "don't seem that excited" about the restraints, and that about 75 pct of AMTDA members responding to a survey about issues important to them said they didn't know of the VRAs' impact or felt they would have little practical impact.

Many of the distributors, Mr. Nappi said, felt "this was just another thing that occurred and they would have to live with it."

Meanwhile, the domestic machine tool industry came into this year with financial problems. Orders for December 1986 for U.S.-made machine tools fell 22 pct from a year earlier, according to the National Machine Tool Builders' Association (NMTBA). At the same time, the trade group reported that orders last year dropped 16 pct from 1985 and that the year-end backlog of unfilled orders was down 28 pct from 1985 levels.

NMTBA also said machine tool orders for all of 1986 were $2.12 billion, compared with $2.53 billion for 1985 and $2.92 billion for 1984. In addition, year-end backlogs were $1.20 billion, down from $1.67 billion at the end of 1985. Machine tool shipments in December were $271.9 million, down 27 pct from a year earlier, and orders for lathes, machining centers, milling machines, grinders, boring mills and other machines used to shape metal through cutting totaled $86.8 million in December. That was a drop of 26 pct from $116.6 million a year earlier, while orders were up from $84 million in November.

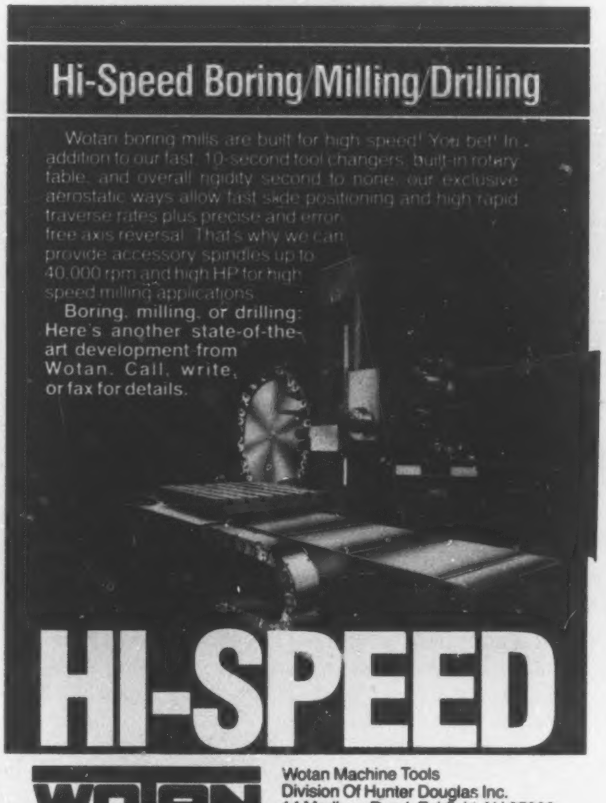
In another area, December orders for metal-forming presses and other machines used to shape metal through pressure totaled $49.3 million, down 16 pct from $58.5 million a year earlier, and December orders in this area were up only 1.3 pct from November.

Industry officials attributed much of this slump to the effects of some provisions of the Tax Reform Act of 1986.

That law eliminated a provision giving businesses a 10 pct tax credit for the purchase of many capital items. In addition, the bill has much less generous provisions for depreciation of major equipment items, and it eliminated the tax credit for most capital goods, retroactive to Jan. 1, 1986.

NMTBA President James Gray said the tax bill had hurt investments in machine tools, adding, "We hope that, as the negative results of eliminating investment incentives become more clear, the need to reinstate tax provisions that encourage growth will also become more clear."

By Whitt Flora



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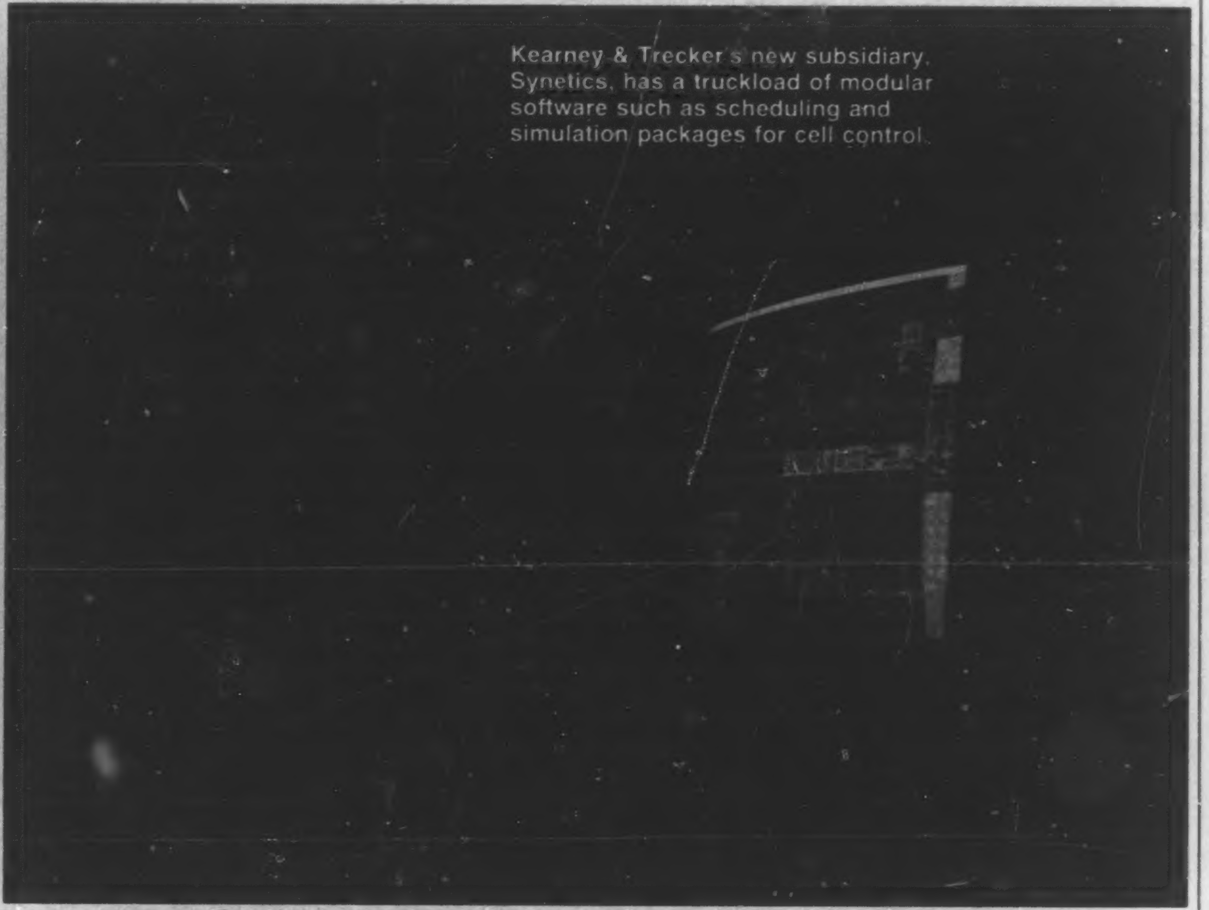


Kearney & Trecker's new subsidiary, Synetics, has a truckload of modular software such as scheduling and simulation packages for cell control.

HERE COME THE CELLS AND CELL CONTROLLERS

To stay afloat in waters infested by new competition and changing markets, companies are abandoning automation for integration, or more specifically, the world of cells and cell controllers.

Ever feel like you are on a treadmill going nowhere? To stay competitive, you've worked overtime, scrimped and saved, bought some automated equipment—some programmable controllers possibly, a CNC machine tool or two, perhaps a robot.

Now suddenly your automation efforts seem inadequate. Now 'integration' not 'automation' is 'in.' So, despite the fact that you've put a lot of effort in getting your computer-controlled machines up and running, they are being labeled 'islands of automation.'

And, like having a cigarette, having islands of automation is no longer cool.

But owning a shop full of stand-alone equipment is no reason to contemplate slitting your wrists. It offers a ready-made platform from which you can integrate isolated production into cooperative work cells.

New competition and rapidly changing markets are demanding that firms again crank up their modernization efforts. Only the flexible integration offered by cells will give the speed and coordination needed to counter bruising off-shore competition.

If devices such as CNC machine tools and programmable controllers (PLCs) represent the the first step in modernizing the factory, a good number of U.S. companies are poised to take the second step: integrating that automation. For most this means combining automation devices into cells.

Central to this effort is the emergence of the cell controller, a computerized supervisor designed to get various machines working in harmony and get timely production data to management.

Fortunately, a diversity of products and services is emerging to meet growing cell control needs. Unfortunately, this hodgepodge of support confuses potential users.

"I think that one of the realities of the cell control market is that it is very much in the embryonic stages," said Don Bell-Irving, manager factory automation marketing, Digital Equipment Corp., Maynard, Mass. "Nobody really knows what a cell controller is. It's different things to different people."

Everyone's Business

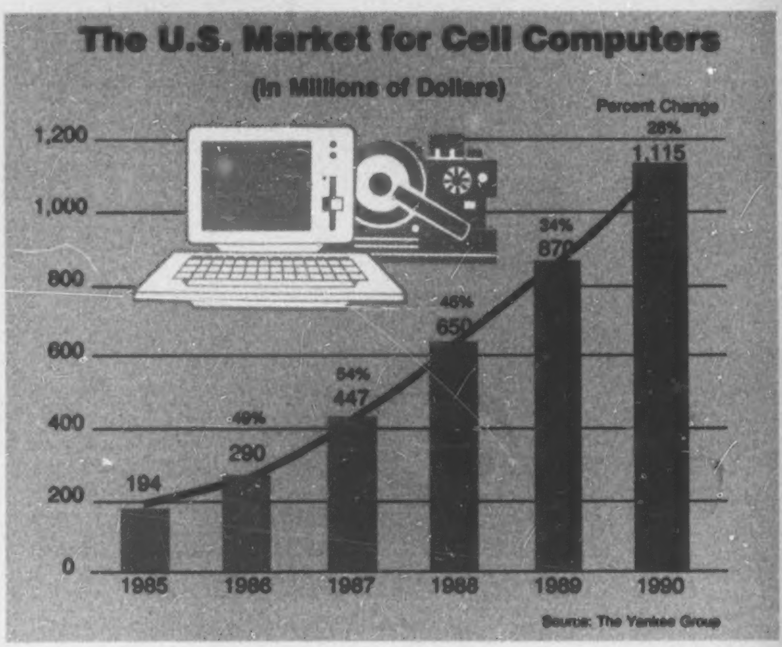
With the parameters of cell control so nebulous, everyone is moving into the cell control business. Manufacturers of corporate and departmental computers such as IBM and Digital are pushing their computer and communications expertise down to the cell level, while control manufacturers such as Allen-Bradley and Gould are pushing their shop floor control knowledge up into the cells.

Besides computer and PLC makers, machine tool builders, robot manufacturers, software suppliers, systems integrators, and a raft of others are targeting the cell control market.

The cell control level, many say, is becoming a real battleground. The reasons for the mad scramble to grab a chunk of this high ground are four-fold:

•The landscape is so ill-defined, almost everyone sees the possibility of staking a claim at least somewhere.

•Of all the levels of automation that are required to integrate a manufacturing operation, the cell level appears to have the most strategic importance as well as the greatest growth potential (see charts, this page). For the cell is the bridge that joins the company's information and production systems. Here is where executive planning and factory control meet head on.



The U.S. Market for Cell Computers

(In Millions of Dollars)

Source: The Yankee Group

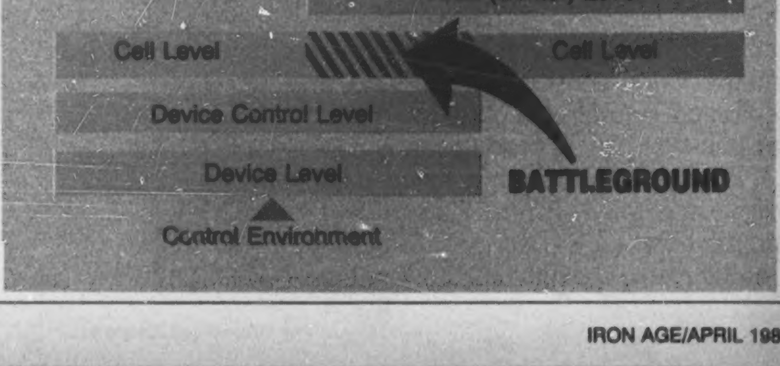
•Whoever controls the cell level, will have a good deal to say about structure of the lower levels of factory automation.

•If the various levels of automation are viewed as stepping stones to computer-integrated manufacturing (CIM), the cell control step is logically the next one for many vendors to address.

Machine tool and PLC builders, spurred by customer requests for integrated offerings, see their growth into cell control as a natural evolution. Similarly, computer firms offering corporate information systems, naturally would like to extend their systems deep into the factory.

Given this diverse crowd of vendors and the still ill-defined landscape of cell control, it is little wonder that many manufacturers are hesitant about proceeding with cell control.

Besides the uncertainty about



Cell Control

The linchpin of Computer Integrated Manufacturing (CIM) what type of cell controller to buy, there is confusion about what it should be doing once installed. For a cell controller's functions are by no means cut and dried.

For example, a cell controller might be used as:

- A manufacturer's communications hub.
- His coordinator and director of shop floor activities.
- The conduit to a broad panorama of devices.
- The collector of production-status information.
- The preparer of data for supervisory front office computers.
- Or the controller of real-time factory floor machines and processes. And this list is by no means complete.

Nevertheless, despite the haziness over what exactly a cell controller does and is, its function can be crystallized to some degree.

John E. Jones, executive vice president, instrumentation and automation systems, Gould, Inc., Rolling Meadows, Ill., divides cell controllers into two types: cell controllers and cell computers.

"I think of cell computers as being information oriented and cell controllers as control oriented," he explained. "Not differentiating between the two functions is causing a lot of confusion."

How vendors view cell control is determined to a large extent by where they are coming from.

Two Worlds

"You have the two worlds that are attempting to make a compromise and what your perspective is determines what your compromise is," observed Dick Omdahl, manager, strategic marketing for automation products, Square D Co., Milwaukee. "If you're from the computer world, you compromise off the real-time aspect of control. If you are from the control world, you compromise in favor of real-time control and eliminate some of the more computer-like functions."

The key to successful cell control, according to Interactive Graphics, is the interaction between the employee and the information and control system.

Because of the variety of vendors and the specific needs of specific manufacturers, cell controllers today, for the most part, are niche products for niche markets, but that will change.

"Today, different people tend to define cell control differently, so the functions within these products are different," observed Mr. Omdahl. "However, I think that is a short term thing. I believe there is going to be more standardization but it will take time."

As Mr. Omdahl notes, companies don't buy a cell controller because they see it as the next step in their factory automation plan but because of a specific need.

For example, an automotive supplier might select a cell controller because the auto company insists that its suppliers keep statistical process control records. Or a welding company that has to continually change its welding parameters might choose cell control as the best way to get its weld schedules down to the welders.

Basic Functions

Yet though cell control today is customized to meet specific needs, cell control requirements fall into several basic areas.

"We feel that there is a pretty generic set of functions that go on in the cell controller, but for the cell controller to be effective, everyone is going to be customized to some degree," explained Jeff Chamberlain, CIM market-development manager for Hewlett Packard's Data Systems Division, Palo Alto, Calif., "so that is why our program involves working with software suppliers to provide some of the basic functions." Then, the necessary customization is left up to systems integrators or the customers themselves.

According to Digital's Mr. Bell-Irving, the two most important basic functions that a cell controller can offer are flexibility and communications.

When deciding how to make a product, firms used to choose production methods that emphasized efficiency and standardization at the expense of flexibility. Today, cell controllers permit both efficiency and flexible production.

"Besides flexibility, today's companies are moving toward integration," said Mr. Bell-Irving. "To run a company economically, you have to coordinate all the different operations within it."

And much of that coordination centers around the cell controller. It must not only coordinate the factory floor but also work with other cell controllers and business planning computers.

"Whatever else it is, a cell controller has to be highly flexible because processes and product mix are going to change," said Mr. Bell-Irving. "And the second absolute requirement we have observed is that it be integratable."

For Jody Kurtzhalts, general manager, Synetics, Milwaukee, the scheduling ability of a cell controller is critical. "At its most basic," she explained, "you need to have a system capable of routing a series of parts."

Synetics software not only offers dynamic machine loading but will optimize work loads as well. For example, if a cell is to make a hundred different parts, and those parts require a variety operations sequences, the software will determine optimum sequencing.

Synetics is a newly formed subsidiary of Kearney & Trecker Corp. It was formed to focus and refine K&T's manufacturing software expertise and adopt it to CIM and cell control demands. That expertise has been accumulating for some 15 years—ever since K&T began selling flexible manufacturing systems.

Already some 5,000 specific software modules have been developed to support some 37 functional tasks, like routing, simulation and inspection.

Inadequate Software

Because of the newness of cell control, one of its problems is a lack of adequate software. A good deal of the software developed today is of the custom variety. Customization is risky, for you never know what you will get until you get it. With time-tested software, K&T and some of the other flexible manufacturing system pioneers believe they have a software edge over the competitors.

The most requested requirements for a cell controller, according to a user survey conducted by the Automation Resource Group, Wellesley, Mass., include capabilities to: communicate; monitor and control; perform management functions (like tool managing and maintenance scheduling); and collect and store data.

One important function left off of the list is the ability of a controller to interact with people.

"The real issue is not just integrating pieces of CIM but integrating people into it," said Deborah Allen, marketing manager, Interactive Images Inc., Woburn, Mass. "Conquering the user interface barrier will be the key determinant of CIM success."

With people in mind, Interactive Images developed EASEL software. The company calls it a user interface development tool. It can be used for cell control, for it has many of the functions of a cell controller such as graphical representation of statistical data, including quality control and statistical process control; data base query, including bill of material and inventory and production order status; data collection applications such as inspection; and production management and control for processes using PLCs.

EASEL, run on an IBM PC, aims at integrating people into computer-integrated manufacturing by allowing workers to enter and retrieve complex information simply by touching customized icons on the computer screen.

And because it is application and hardware independent, the software can serve as a front end to any existing CIM environment.

A final point: maybe the most important one. Despite the focus today on cell control hardware and software, neither should enter the picture when initially considering cellular manufacturing.

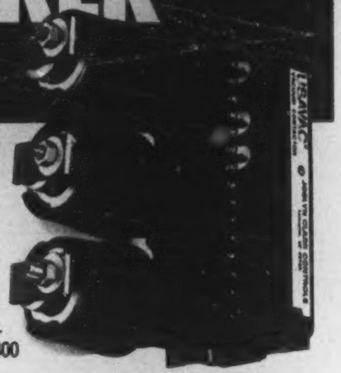
"Discussions about specific software and hardware at the conceptual road map level—where you are going to proceed and how you are going to get there—is a tremendous blind alley," cautioned David Lilly, vice president and general manager, automated systems division, Integrated Automation, Alameda, Calif. "A tremendous amount of our creativity goes early on into choosing between technologies, rather than first determining what has to be done. Most projects are ruined by its technology junkies.

"We say we are taking a systems approach to designing our modern factory, but we don't work out the whole architecture of functional assignments for the cells.

"I really think that the local area network issues, the MAP protocol issues, the cell controller hardware issues are distracting us from the basics of how we are going to engineer this thing."

By Robert E. Harvey

DIRTY WORKER



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ENERGY PRICES FUEL A PRICE RISE

Sharply higher energy prices spurred a 0.6 jump in seasonally adjusted producer prices for finished goods in January, reversing a slight price drop in December and modest increases for several months before that.

The U.S. Labor Department also noted that the prices for finished energy goods rose 9.9 pct, fueling a 0.7 pct increase for finished consumer goods in January.

In relation to major industries, the index for the net output of the domestic manufacturing sector advanced 0.8 pct in January after recording no change in December and a slight rise in November. The index for capital equipment moved up 0.2 pct in January, after inching up 0.1 pct in December. Prices advanced for aircraft, metal cutting machine tools, and transformers.

In contrast, prices declined for motor vehicles and textile machinery. Passenger cars had a price decline of 0.2 pct, following a 0.2 pct increase in December and a 0.2 drop in November.

Meanwhile, the durable manufacturing materials index registered a 1.0 pct advance for the latest month, with higher prices for hot and cold rolled steel sheets and strip, and copper. Prices for steel mill products rose 1.1 pct in January after no change in the previous month.

Prices in the domestic mining industry climbed 6.4 pct over the month, but were 22.2 pct lower than the year-ago level.

The department's longer range statistics showed that from January 1986 to January 1987, the finished goods price index fell 1.5 pct, and capital equipment prices were up 2.4 pct. But during that period, the index for energy products dropped 31.7 pct, holding down some other price increases.

Latest Month Covered: January 1987

Products	Index Reading For Month (1967 = 100)	Pct Change From Previous Month	Pct Change From Year-Ago Month
Metal Cutting Machine Tools	411.4	+ 0.8	+ 3.2
Metal Forming Machine Tools	443.1	+ 0.2	+ 1.2
Agricultural Machinery & Equip.	341.2	+ 0.4	+ 0.8
Construction Machinery & Equip.	370.8	0	+ 1.6
Oil and Gas Field Machinery	410.4	0	– 3.4
Industrial Material Handling Equip.	297.9	+ 0.1	+ 0.8
Pumps, Compressors & Allied Equip.	364.6	+ 0.2	+ 2.0
Mining Machinery & Equipment	383.8	+ 0.7	+ 0.4
Mechanical Power Transmission Equip.	349.5	+ 0.1	+ 2.8
Automobiles	247.0	– 0.3	+ 7.6
Motor Trucks—Light	324.2	+ 0.1	+ 5.9
Motor Trucks—Heavy	347.0	– 0.3	– 0.7
Railroad Equipment	364.5	0	– 0.6
Fabricated Metal Structural Products	315.9	– 0.3	+ 0.3
Electric Motors	352.0	– 0.2	+ 0.6
Valves & Fittings (Dec. 1982 = 100)	107.7	+ 0.3	+ 1.6
Ball & Roller Bearings	355.9	+ 0.1	+ 0.7
Foundry & Forge Shop Products	363.9	+ 0.2	0
Heating Equipment	271.5	– 0.1	+ 2.6
Plumbing Fixtures & Brass Fittings	323.9	+ 0.5	+ 2.9
Metal Containers	361.4	– 0.3	– 0.1
Internal Combustion Engines	353.9	0	+ 1.6

Data based on U.S. Labor Dept.'s Producer Price Index

MATERIALS PRICES

PRICE & PRODUCTION DATA

(Effective March 2, 1987)

Steel production by districts, thousands of tons (000 omitted)

	Last Week	Two Weeks Ago	Month Ago	Year Ago
Northeast Coast	157	146	119	202
Pittsburgh	199	187	170	251
Youngstown	109	114	110	113
Lake Erie	120	117	111	163
Detroit	156	146	150	150
Chicago	314	342	337	521
Midwest	168	175	163	152
Southern	158	158	138	224
Western	45	45	39	92
U.S. Production	1,426	1,430	1,337	1,868

Source: American Iron & Steel Institute

Lake Superior Ore Prices

51.50% Fe Natural delivered lower Lake ports unless otherwise stated. Rail transportation, handling and unloading may be charged to buyer. Coarse ore 80¢ premium.

Pellets (per iron unit natural)	gross-ton 58.0*
Pellets (per iron unit natural)	gross-ton 59.4**
Pellets (per iron unit natural)	gross-ton 72.45-86.9***
Mesabi, regular-unscreened	gross-ton 32.53
Mesabi, non-bessemer	gross-ton 30.03-31.53

*58.0¢—Mineral Services, Inc. as of 8/13/85. **59.4¢—Inland Steel Mining, 1/1/85 and Pickands Mather, 8/1/85, delivered hold of vessel, upper lake ports. ***72.5¢—U.S. Steel as of 8/16/85. 86.9¢—Oglebay Norton 3/25/82, Hanna Mining and Cleveland Cliffs, 2/26/82.

STEEL PRODUCTION, COMPOSITE PRICES

(Effective March 2, 1987)

U.S. Steel Production	Last Week	Two Weeks Ago	To Date 1986	To Date 1985
Net tons, in thousands	1,426	1,430	11,826	14,802
Capability Utilization Rate	66.2	66.4	65.1	70.4

Composite Prices	This Week	Week Ago	Month Ago	Year Ago
Finished Steel Base* (¢/lb.—eff. 1/4/87)	25.236	25.236	25.236	24.607
Pig Iron** (Net ton= 2000 lbs.)	$213.00	$213.00	$213.00	$213.00
Scrap No. 1 hvy.*** (Gross ton=2240 lbs.)	$ 74.83	$ 76.50	$ 77.50	$ 73.50
No. 2 bundles	$ 50.50	$ 51.17	$ 51.17	$ 52.83

Scrap Comparison (Gross Ton)				
No. 1 steel, Pittsburgh	$ 79.50	$ 80.50	$ 82.50	$ 73.50
No. 1 steel, Philadelphia	70.50	70.50	71.50	72.50
No. 1 steel, Chicago	74.50	78.50	78.50	74.50
No. 1 bundles, Detroit	76.50	83.50	85.50	65.50
Low Phos., Youngstown	80.50	82.50	82.50	73.50
No. 1 mach'y cast., Pgh	74.50	74.50	74.50	73.50
No. 1 mach'y cast., Phila	93.50	93.50	93.50	93.50
No. 1 mach'y cast., Chi	95.50	101.50	101.50	109.50

*Finished Steel Composite: Weighted index of steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.
**Pig Iron Composite: Based on average prices for basic and foundry pig iron at representative producing points within the U.S.
***Steel Scrap Composite: Average of No. 1 hvy. melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

NONFERROUS PRICES

(Effective March 2, 1987) Prices obtained in trade based on representative tonnages per gross ton delivered to consumer unless otherwise stated.

Primary Metal Prices

(cents per lb.)	current price	last price	date of change
Aluminum (LME)	58.75	59.00	3/2/87
Copper (C)	67.50	64.50	2/26/87
Lead	26.00	27.00	2/2/87
Magnesium Ingot	153.00	148.00	12/9/85
Nickel (LME)	171.00	172.00	3/2/87
Zinc	47.00	44.50	10/6/86

ALUMINUM: Avg. for last week & previous week. COPPER (C)=cathode. LEAD: common grade. MAGNESIUM: 99.8% pig delivered. NICKEL: Avg. for last week & previous week. ZINC: high grade.

Antimony, American Loredo, Texas	$2.00
Beryllium-aluminum 5% Be, per lb. contained Be	$248.00
Beryllium-copper, per lb. cont. Be	$152.00
Beryllium 97% powder 200	$196.00
Cadmium, ton lots	$1.50
Calcium, ton lots, crown	$3.92
Chromium, 99.5% electro	$4.62
Cobalt, 99%, cathode	$12.50
Gold, per troy oz.	$404.25
Indium, per troy oz.	$3.25
Iridium, per troy oz.	$411.00
Magnesium sticks, 10,000 lbs.	$2.12
Mercury, per 76-lb., f.o.b. N.Y.	$200.00-225.00
Molybdenum, lb. tech. moly oxides, 20 lb. MO can	$3.45
Palladium, per troy oz.	$123.00
Platinum, per troy oz.	$520.00
Rhodium, per troy oz.	$1,198.00
Silver ingots, per troy oz.	$5.44
Titanium sponge, melt grade	$3.40-3.55
Tungsten powder, hyd red	$9.53-9.85
Vanadium	$6.00
Zirconium sponge	$11.20-17.00

(Per lb. unless otherwise noted)

Straits Tin Price

(U.S. cents per lb. EX-SMELTER, based on daily market in [illegible] in Malaysian dollars per kilo.)

February [illegible]—300.00
February 24—298.00
February 25—29[illegible]
February 26—298.00
February 27—301.00

Scrap Prices
Brass Mill Scrap

(Cents per lb., over 20,000 lbs. add 1¢ per lb.)

	Solids	Turnings
Copper	55½	50½
Yellow brass	49	48
Red brass	50	46
Comm. bronze	51½	46½
Mang. bronze	38½	37½
Free cutting rod ends	48	47

Custom Smelters Scrap

(Cents per lb., carload lots, del. refinery)

No. 1 copper wire	55
No. 2 copper wire	46
Light copper	40

Ingot Makers Scrap

(Cents per lb., carload lots, del. refinery)

No. 1 copper wire	48
No. 2 copper wire	40
Light copper	33
No. 1 composition	41
No. 1 comp. turnings	41
Hvy. yellow brass solids	29
Hvy. yellow brass turnings	23
Radiators	27

Aluminum

New mixed clips	32 — 33
Old sheet	29 — 30
Old cast	29 — 30
Clean dry borings	30 — 31

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Aluminum

Segregated clippings	29 — 30
Mixed L.C. clips	27 — 28
Old sheets and cast	24 — 25
Borings and turnings	20 — 21
Duraluminum clippings	25 — 26

Copper and Brass

No. 1 copper wire	44 — 47
No. 2 copper wire	35 — 36
Light copper	32 — 33
Radiators	22 — 23
No. 1 composition	36 — 37
No. 1 composition turnings	34 — 35
Cocks and faucets	30 — 31
Clean heavy yellow brass	26 — 28
Brass pipe	26 — 27
New soft brass clippings	39 — 40

Lead

Heavy soft lead	9 — 10
Whole batteries	1 — 2
Type metal	18 — 19
Electrotype	15 — 16

Nickel

Nickel solids	100 —110
Nickel rod ends	100 —110
Nickel sheets, clips	100 —110
Nickel turnings	25 — 35

Zinc

New zinc clippings	14 — 15
Old diecast zinc	10 — 11

MATERIALS PRICES

EFFECTIVE MARCH 2, 1987

(Effective March 2, 1987) Prices obtained in trade based on representative tonnages per gross ton delivered to consumer unless otherwise stated. Prices are the opinions of Iron Age editors and correspondents, based on contacts with dealers, brokers, generators and users in the industry on the effective date listed above.

Ferrous Scrap Prices

Pittsburgh

No. 1 hvy. melting	$ 79.00 to	$ 80.00
No. 2 hvy. melting	69.00 to	70.00
No. 1 dealer bundles	98.00 to	99.00
No. 1 factory bundles (auto)	101.00 to	102.00
No. 2 bundles	45.00 to	46.00
No. 1 busheling	96.00 to	97.00
Machine shop turnings	8.00 to	9.00
Shoveling turnings	46.00 to	47.00
Cast iron borings	45.00 to	46.00
Low phos. punchings plate	99.00 to	100.00
Heavy turnings	69.00 to	70.00
No. 1 RR hvy. melting	84.00 to	85.00
Rails, 2 ft. and under	98.00 to	99.00
Scrap rails, random lgth	87.00 to	88.00
RR specialties	101.00 to	102.00
No. 1 machinery cast	74.00 to	75.00
Cupola cast	67.00 to	68.00
Heavy breakable cast	30.00 to	31.00
Stainless		
18-8 bundles and solids	490.00 to	495.00
18-8 turnings	390.00 to	395.00

Chicago

No. 1 hvy. melting	$ 74.00 to	$ 75.00
No. 2 hvy. melting	70.00 to	71.00
No. 1 dealer bundles	92.00 to	93.00
No. 1 factory bundles (auto)	92.00 to	93.00
No. 2 dealer bundles	60.00 to	61.00
No. 1 busheling	84.00 to	85.00
Shredder scrap	80.00 to	81.00
Machine shop turnings	22.00 to	23.00
Mixed borings and turnings	15.00 to	16.00
Shoveling turnings	25.00 to	26.00
Cast iron borings	40.00 to	41.00
Low phos. forge crop	95.00 to	96.00
Low phos. punchings plate 1/4 in. and heavier	110.00 to	111.00
Low phos. 2 ft. and under	103.00 to	104.00
No. 1 RR hvy. melting	78.00 to	79.00
Scrap rails random lgth	77.00 to	78.00
Reroller rails	100.00 to	101.00
Rails, 2 ft. and under	94.00 to	95.00
RR couplers and knuckles	75.00 to	76.00
RR car axles	100.00 to	101.00
No. 1 machinery cast	95.00 to	96.00
Cupola cast	85.00 to	86.00
Stove plate	96.00 to	97.00
Steel car wheels	81.00 to	82.00
Stainless		
18-8 bundles and solids	460.00 to	470.00
18-8 turnings	350.00 to	360.00
430 bundles and solids	125.00 to	135.00
430 turnings	85.00 to	95.00

Philadelphia

No. 1 hvy. melting	$ 69.00 to	$ 72.00
No. 2 hvy. melting	61.00 to	64.00
No. 1 dealer bundles	84.00 to	87.00
No. 2 dealer bundles	44.00 to	47.00
No. 1 busheling	81.00 to	84.00
Shredder scrap	84.00 to	87.00
Machine shop turnings	24.00 to	27.00
Mixed borings and turnings	24.00 to	27.00
Shoveling turnings	39.00 to	42.00
Low phos. 5 ft. and under	78.00 to	81.00
Low phos. 2 ft. punchings	96.00 to	99.00
Electric furnace bundles	94.00 to	97.00
RR specialties	80.00 to	83.00
Rails, 2 ft. and under	96.00 to	99.00
Cupola cast	80.00 to	83.00
Heavy breakable cast	52.00 to	55.00
No. 1 machinery cast	92.00 to	95.00

Detroit

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 49.00 to	$ 50.00
No. 2 hvy. melting	48.00 to	49.00
No. 1 dealer bundles	76.00 to	77.00
No. 2 bundles	39.00 to	40.00
No. 1 busheling	74.00 to	75.00
Drop forge flashings	41.00 to	42.00
Machine shop turnings	20.00 to	21.00
Mixed borings and turnings	6.00 to	7.00
Shoveling turnings	20.00 to	21.00
Cast iron borings	20.00 to	21.00
Heavy breakable cast	32.00 to	33.00
Mixed cupola cast	47.00 to	48.00
Automobile cast	71.00 to	72.00
Stainless		
18-8 bundles and solids	440.00 to	450.00
18-8 turnings	290.00 to	300.00
430 bundles and solids	115.00 to	125.00

Youngstown

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 63.00 to	$ 64.00
No. 2 hvy. melting	60.00 to	61.00
No. 1 dealer bundles	85.00 to	86.00
No. 2 dealer bundles	35.00 to	36.00
Machine shop turnings	15.00 to	16.00
Shoveling turnings	15.00 to	16.00
Low phos. plate	80.00 to	81.00
Electric furnace bundles	70.00 to	71.00
Galvanized bundles	67.00 to	68.00

Cleveland

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 59.00 to	$ 60.00
No. 2 hvy. melting	56.00 to	57.00
No. 1 dealer bundles	84.00 to	85.00
No. 1 factory bundles	85.00 to	86.00
No. 2 bundles	34.00 to	35.00
No. 1 busheling	74.00 to	75.00
Machine shop turnings	14.00 to	15.00
Shoveling turnings	14.00 to	15.00
Cast iron borings	19.00 to	20.00
Cut structural & plates, 5 ft. and under	73.00 to	74.00
Cut structural & plates, 2 ft. and under	94.00 to	95.00
Low phos. punchings plate	94.00 to	95.00
Foundry steel, 2 ft. & under	58.00 to	59.00
No. 1 RR hvy. melting	65.00 to	66.00
Rails, 2 ft. and under	97.00 to	98.00
Rails, 18 in. and under	99.00 to	100.00
No. 1 machinery cast	85.00 to	86.00
Mixed cast	52.00 to	53.00
Stainless		
18-8 bundles	445.00 to	455.00
18-8 turnings	295.00 to	305.00
430 bundles	120.00 to	130.00

Buffalo

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 55.00 to	$ 56.00
No. 2 hvy. melting	45.00 to	46.00
No. 1 busheling	79.00 to	80.00
No. 1 dealer bundles	79.00 to	80.00
No. 2 bundles	31.00 to	32.00
Machine shop turnings	13.00 to	14.00
Mixed borings and turnings	13.00 to	14.00
Shoveling turnings	19.00 to	20.00
Cast iron borings	27.00 to	28.00
Low phos. plate	80.00 to	81.00
Structural and plate, 2 ft. and under	82.00 to	83.00
Rails, 2 ft. and under	81.00 to	82.00
Scrap rails, random lgth	63.00 to	64.00
No. 1 machinery cast	76.00 to	77.00
No. 1 cupola cast	71.00 to	72.00

St. Louis

No. 1 hvy. melting	$ 70.00 to	$ 71.00
No. 2 hvy. melting	59.00 to	60.00
No. 1 busheling	84.00 to	85.00
No. 1 dealer bundles	85.00 to	86.00
No. 2 bundles	56.00 to	57.00
Machine shop turnings	17.00 to	18.00
Shoveling turnings	21.00 to	22.00
Cast iron borings	26.00 to	27.00
No. 1 RR hvy. melting	79.00 to	80.00
Rails, random length	76.00 to	77.00
Rails, 5 ft. and under	91.00 to	92.00
RR specialties	79.00 to	80.00
Cupola cast	66.00 to	67.00
Heavy breakable cast	40.00 to	41.00
Stove plate	85.00 to	86.00
Steel car wheels	85.00 to	86.00
Reroling rails	99.00 to	100.00
Unstripped motor blocks	49.00 to	50.00

Birmingham

No. 1 hvy. melting	$ 73.00 to	$ 74.00
No. 2 hvy. melting	69.00 to	70.00
No. 1 dealer bundles	73.00 to	74.00
No. 2 bundles	49.00 to	50.00
No. 1 busheling	73.00 to	74.00
Shredder scrap	95.00 to	96.00
Machine shop turnings	28.00 to	29.00
Shoveling turnings	39.00 to	40.00
Cast iron borings	36.00 to	37.00
Electric furnace bundles	69.00 to	70.00
Elec. furnace, 3 ft. & under	75.00 to	76.00
Structural and plate, 2 ft.	94.00 to	95.00
Structural and plate, 4 ft.	86.00 to	87.00
No. 1 RR hvy. melting	86.00 to	87.00
Scrap rails, random lgth	80.00 to	81.00
Rails, 2 ft. and under	97.00 to	98.00
Angles and splice bars	86.00 to	87.00
No. 1 cupola cast	82.00 to	83.00
Unstripped motor blocks	74.00 to	75.00

Cincinnati

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 57.00 to	$ 58.00
No. 2 hvy. melting	51.00 to	52.00
No. 1 dealer bundles	79.00 to	80.00
No. 2 bundles	30.00 to	31.00
Machine shop turnings	11.00 to	12.00
Shoveling turnings	14.00 to	15.00
Cast iron borings	24.00 to	25.00
Low phos. 18 in. and under	82.00 to	83.00
Rails, random length	64.00 to	65.00
Rails, 2 ft. and under	84.00 to	85.00
No. 1 cupola cast	66.00 to	67.00
Heavy breakable cast	29.00 to	30.00
Drop broken cast	71.00 to	72.00

New York

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 38.00 to	$ 40.00
No. 2 hvy. melting	31.00 to	32.00
No. 2 dealer bundles	20.00 to	22.00
Mixed borings and turnings	10.00 to	11.00
Machine shop turnings	4.00 to	6.00
Shoveling turnings	10.00 to	12.00
Clean cast, chem. borings	35.00 to	36.00
No. 1 machinery cast	79.00 to	80.00
Mixed yard cast	50.00 to	51.00
Heavy breakable cast	10.00 to	12.00
Stainless		
18-8 prepared solids	370.00 to	390.00
18-8 turnings	270.00 to	310.00
430 prepared solids	90.00 to	100.00
430 solids	75.00 to	85.00

Boston

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 49.00 to	$ 51.00
No. 2 hvy. melting	39.00 to	41.00
No. 1 dealer bundles	53.00 to	55.00
No. 2 bundles	32.00 to	34.00
No. 1 busheling	56.00 to	58.00
Shredder scrap	59.00 to	61.00
Machine shop turnings	12.00 to	14.00
Shoveling turnings	18.00 to	20.00
No. 1 machinery cast	72.00 to	77.00
Mixed cupola cast	44.00 to	46.00
Heavy breakable cast	8.00 to	10.00

San Francisco

No. 1 hvy. melting	$ 40.00 to	$ 42.00
No. 2 hvy. melting	34.00 to	36.00
No. 1 dealer bundles	31.00 to	33.00
No. 2 dealer bundles	20.00 to	21.00
Machine shop turnings	8.00 to	9.00
Cast iron borings	8.00 to	9.00
No. 1 cupola cast	80.00 to	82.00

Los Angeles

No. 1 hvy. melting	$ 34.00 to	$ 36.00
No. 2 hvy. melting	28.00 to	30.00
No. 1 dealer bundles	26.00 to	28.00
No. 2 dealer bundles	16.00 to	18.00
Machine shop turnings	7.00 to	8.00
Shoveling turnings	8.00 to	9.00
Cast iron borings	8.00 to	9.00
Elec. furnace, 1 ft. and under (foundry)	67.00 to	69.00
No. 1 cupola cast	72.00 to	74.00

Seattle

No. 1 hvy. melting	$ 60.00 to	$ 62.00
No. 2 hvy. melting	51.00 to	53.00
No. 2 bundles	35.00 to	37.00
No. 1 cupola cast	89.00 to	90.00
Mixed yard cast	80.00 to	82.00

Hamilton, Ont.

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$ 76.00
No. 2 hvy. melting, cut 2 ft. and under	66.00
No. 1 dealer bundles	86.00
No. 2 bundles	58.00
Mixed steel scrap	51.00
Bush. new fact. prep'd	86.00
Bush. new fact. unprep'd	69.00
Machine shop turnings	30.00
Short steel turnings	30.00
Mixed borings and turning	19.00
Cast scrap	97.00

Houston

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 64.00 to	$ 65.00
No. 2 hvy. melting	54.00 to	55.00
No. 2 bundles	33.00 to	34.00
Machine shop turnings	13.00 to	14.00
Crushed turnings	23.00 to	24.00
Shredder scrap	75.00 to	76.00
Cut structural plate, 2 ft. and under	87.00 to	88.00
Cut structural plate, 5 ft. and under	72.00 to	73.00
Unstripped motor blocks	52.00 to	53.00
Cupola cast	83.00 to	84.00

IRON AGE

FEBRUARY 1987

MANUFACTURING MANAGEMENT

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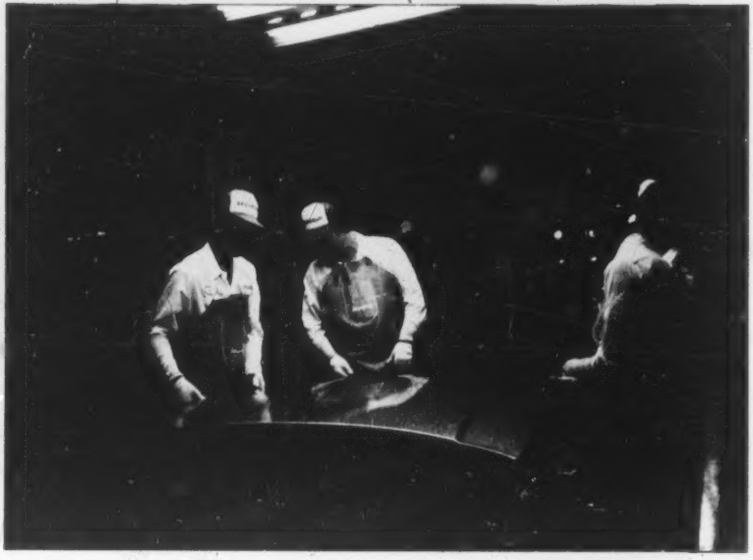
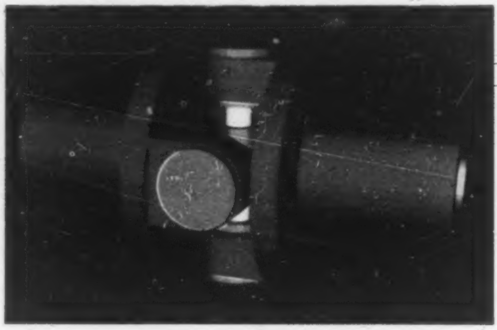


Automakers & Steelmakers Team Up to Improve Quality

Why Micro Cad is Sweeping the Country



Yes, [illegible]ers Can Export

IRON AGE
MANUFACTURING MANAGEMENT

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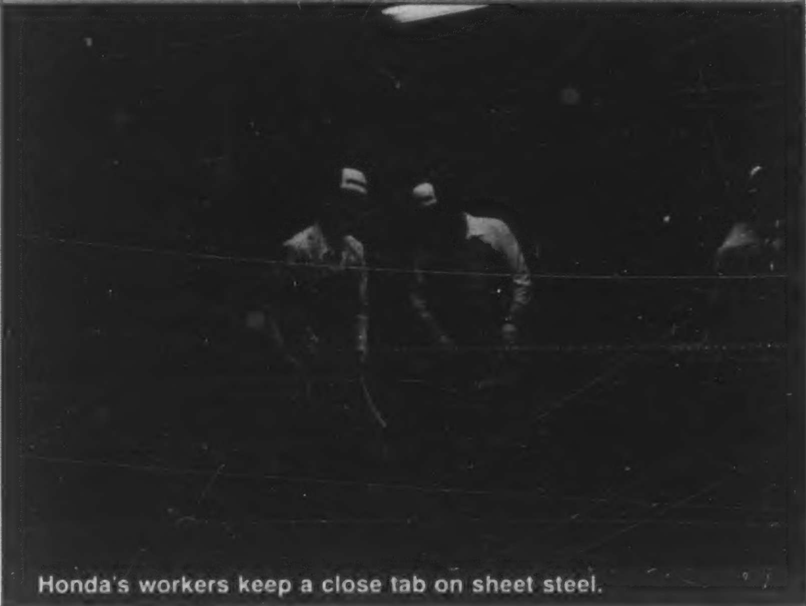

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U.S. BATTLES THE WORLD WITH MORE EXPORTS AND OFFSHORE MANUFACTURING

American exporters have learned that they must be able to export whether the dollar is weak or strong. The weak dollar is helping them now, but success in exporting depends on more fundamental factors.

BY BRYAN BERRY

The strong dollar has been a primary cause of the U.S. trade deficit that's spiralled higher and higher over the past five years. Now the dollar has fallen 40 pct against the Japanese yen and Deutschemark since its peak in February 1985.

"We can't alibi that the yen is the problem now," said Chrysler Chairman Lee Iacocca at a recent press conference. "We can't be crybabies any more."

Ironically, the initial impact of the weaker dollar was to raise the dollar value of our trade deficit. That's because the imports from Japan and Germany now have a higher dollar value. Manufacturers in those countries, however, don't plan to lose their U.S. market share by raising their prices as much as their currencies have risen. The result: thinner profit margins and even operating losses for some Japanese and German companies.

The total U.S. trade deficit of $149 billion in 1985 grew to about $170 billion in 1986, including a $137 billion deficit in manufactured goods. But the trade deficit peaked in 1986, say senior Dept. of Commerce (DOC) economists. They predict it will fall to $140-150 billion this year.

U.S. exports to both Japan and the European Economic Community (EEC) declined from 1984 to 1985. But last year they rose sharply. U.S. exports to Japan increased 19 pct from the first nine months of 1985 to the same period in 1986, from $17 billion to $20 billion. Exports to the EEC rose from $37 billion to $39 billion.

It takes 24 months for a change in the exchange rate to make its full impact on the trade deficit, estimate DOC economists. The two-year period ends this month—which means that U.S. business will get all the benefits of the weak dollar this year.

However, the exchange rate will help our trade only with Japan and Europe. The dollar has remained about the same against the currencies of Canada, Australia, Latin America and such newly industrialized countries in Asia as Korea and Taiwan.

Other problems not helped by our weak dollar are the poor economies and huge debts of many Latin American nations.

Also, the Japanese and European economies have been growing, but not fast enough to greatly increase their imports.

Still, U.S. industry exported $213 billion in 1985, including $47 billion to Canada, $46 billion to the EEC, and $23 billion to Japan. Those figures will grow this year, and the weak dollar is just one reason why.

The first lesson successful American exporters have learned is that they must be able to export whether the dollar is weak or strong. The weak dollar is helping them now, but their success in exporting depends on more fundamental factors: How unique is their product, how efficient is their manufacturing, how good is their quality?

Such factors explain why Japanese manufacturers have been able to continue increasing their exports whether the yen is strong or weak. Some Japanese automakers even have plans to streamline operations so that they can make a profit when the yen is even stronger than now.

Unfortunately, many American businessmen believe that low cost is the major strength of Japanese companies. This is a myth, charged Michael E. Porter, a professor at Harvard Business School, in a speech last year.

"We must innovate in areas that our competitors can't easily imitate," said Mr. Porter. "We can develop advantages based on technology, on distribution, on how we relate to the customer, and on how we differentiate our products."

Too many American companies

Our Top Trading Partners in Manufactured Goods (1985)

(In Billions of Dollars)

Country	Exports	Imports	Surplus or Deficit
Canada	42.4	50.6	-8.2
Japan	12.4	71.6	-59.2
Mexico	10.8	9.1	+1.7
United Kingdom	10.1	11.2	-1.1
W. Germany	7.5	20.3	-12.8
France	5.2	8.6	-3.4
Australia	5.1	0.8	+4.3
The Netherlands	4.3	2.9	+1.4
Saudi Arabia	3.9	0.2	+3.7
South Korea	3.6	10.5	-6.9
Italy	3.0	8.9	-5.9
Singapore	3.0	3.8	-0.8
Taiwan	2.9	17.3	-14.4
Brazil	2.2	4.7	-2.5
Hong Kong	2.1	8.9	-6.8

Source: U.S. Dept. of Commerce

with plants and salespeople around the globe are not coordinating them globally, said Mr. Porter. In many cases, U.S. companies are positioned internationally even better than the Japanese. Companies like General Motors, Ford, Timken, and Federal-Mogul have had European facilities for several decades. Some have had plants in Korea, Taiwan, Australia, and other Pacific countries since after World War II. The people in some countries, like Korea, prefer to do business with Americans, not Japanese.

But American companies have tended to squander such advantages. They've taken a "multidomestic approach to international strategy," said Mr. Porter, and developed companies with a "local face," said University of Michigan business professor C.K. Prahalad. In an extreme example, General Motors in Detroit had almost no links with its British and German subsidiaries, Vauxhall and Opel, in the late 1970s. In contrast, Honda and Nissan's Japanese headquarters help fine-tune production at their U.S. plants to meet world market demand.

U.S. Trade in Manufactured Goods, 1980 - 1985

(In Billions of Dollars)

Year	Exports	Imports	Surplus or Deficit
1980	156	139	+17
1981	167	156	+11
1982	151	158	-7
1983	143	178	-35
1984	158	242	-84
1985	162	269	-107

Source: U.S. Dept. of Commerce

Battling Foreign Competition

Mr. Prahalad vigorously preaches the importance of U.S. firms challenging foreign competitors in their own home markets. "Take on the Japanese where they're most vulnerable—in Japan," he advises. "When the Japanese come to the U.S. to compete, they expose maybe 15 pct of their capital flow to U.S. competition. Perhaps 90 pct of the U.S. firm's capital flow is exposed to the Japanese competition, so it's in much greater danger."

When Michelin invaded the U.S. tire market, Goodyear struck back at Michelin's European base—blunting the French company's attempt to grab U.S. market share.

Too often U.S firms have jumped into foreign markets through joint ventures with foreign firms. American firms gave Japanese companies their technology in exchange for access to the Japanese market. The result, points out University of Michigan business professor Vladimir Pucik: "The Japanese competitors got the American technology and kept their home market." Later they used this technology to invade the U.S. market.

"Joint ventures are a symptom of the problem, not a solution," said Mr. Pucik. American companies' first priority should be beating the Japanese and European competition, preferably in their own home markets.

The same is true when Japanese companies seek joint ventures with U.S. companies in the U.S. "If access to the U.S. market is our strength, we shouldn't give that up easily to the Japanese," said the professor.

Joint ventures that make sense,

id Mr. Pucik, are ones in which ither partner is dominant and th companies win something. quity relationships sometimes e advisable, too.

"We certainly want to keep our ghly proprietary technologies to rself," said Robert R. Kurth, rg-Warner Automotive (BWA) c.'s director of strategic market- g.

BWA has set up wholly owned bsidiaries in Great Britain, est Germany, Japan, and Cana- to manufacture proprietary ansmission components. BWA so has joint ventures in Mexico, lombia, Venezuela, and Japan.

Thirty-six pct of BWA's $1.1 bil- n in worldwide sales are to for- gn automakers. The company ports manual transmissions, nission-control devices, and ansmission components from its S. plants. Some of these come ck to the U.S. in imported cars.

xports by Small Companies

It's not just the billion-dollar ms that are exporting from eir U.S. plants. University of ichigan professor William G. oller, Jr. recently identified 165 porting companies within a sin- e county, Washtenaw, which in- des Ann Arbor, Mich. Most of ese firms have $10-15 million in nual sales. Exports account for pct or less of sales of half the mpanies.

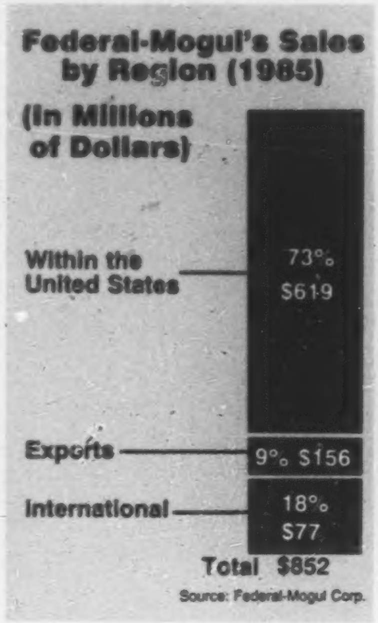
Significantly, none of the ashtenaw County companies at were exporting in 1980 had pped doing so by 1985—despite e big jump in the dollar's ex- ange rate. Of the 165 firms, 23 make machinery other than ectrical; 21 pct, measuring, ana- zing, and controlling instru- ents; 17 pct, business services; d 10 pct, electrical and electron- machinery.

Many of the smaller and medi- -size exporters in southeastern ichigan ship to U.S.-owned to, tractor, or supplier plants in nada, Mexico, and Europe.

Manchester Stamping Corp. anchester, Mich.), for example, ols up for GM, Ford, and Chrysler's U.S. plants and ships the same-type metal stampings and assemblies to the Big 3's Canadian plants. Exports make up 5 pct of its annual $11 million in sales. So far all the exports are due to U.S.-issued orders.

Now company president Wayne T. Hamilton wants to sell his stampings directly to foreign buyers. "The future lies in being able to export to countries like Japan, Mexico, Korea, and others in Europe and on the Pacific Rim," Mr. Hamilton told *Iron Age*.

Sixty companies in Washtenaw County that are not exporting now told Prof. Moller that they expect to or want to begin exporting this year.



Source: Federal-Mogul Corp.

Pricing and Exchange Rates

In the steel-supplier industry, a medium-size exporter is Consolidated Ceramic Products (CCP) and its subsidiary, Comat (Blanchester, Ohio). Comat exports tundish boards and impact pads to the major Canadian steelmakers.

CCP exports thermocouple protection tubes and fluxing pipes (through which gas is injected into molten aluminum in reverb furnaces) to Canada, Western Europe, Israel, Egypt, Australia, and Thailand. The two companies' exports add up to less than $5 million, 10 pct of their sales.

Comat has another foreign connection: Its tundish boards use technology licensed from Germany's Heinrich Odermath GMBH. Odermath has licensed Comat to sell the boards only in the U.S. and Canada. Comat's impact boards use Comat's own technology, so Comat can sell them outside North America.

R. Bruce Mickey, president of CCP and Comat, attributes the companies' success in exporting to the uniqueness of their products. "If we had a me-too product, we simply couldn't sell it around the world," said Mr. Mickey.

Since the art of steelmaking varies from country to country, Comat designs its tundish boards differently for different countries. As long as the boards' price is in the same ballpark as its competitors, pricing is not a major issue, said Mr. Mickey.

"The commodity-type products are more affected by the exchange rate than the kind of specialized, proprietary products we sell," said Richard M. Szary, group vice president and group executive for Federal-Mogul's general products group.

Federal-Mogul (F-M) exports to Japan several million dollars' worth of fasteners for the aircraft and industrial markets plus (from its English plant) air spindles for computer and circuit-board makers. So far the stronger yen has not enabled the Detroit-based F-M to raise its exports to Japan.

On the other hand, the weaker dollar has helped F-M increase its exports of bearings, seals, and valves to the European aftermarket. Mr. Szary estimates that the exchange rate affects the volume of such exports by 5-10 pct.

Manufacturing Abroad

Federal-Mogul acquired, rather than built, most of its manufacturing facilities in France, Spain, Italy, West Germany, and Great Britain.

(Cont. on p. 23.)

Twenty seven pct of the company's $852 million in sales in 1985 were to foreign countries: $156 million from F-M's overseas plants and $77 million by export from the U.S.

"We do most of our manufacturing for the European original equipment market in Europe," explained Mr. Szary. "We export from our U.S. plants more for the aftermarket, since that can be served equally well by U.S. exports or European manufacturing."

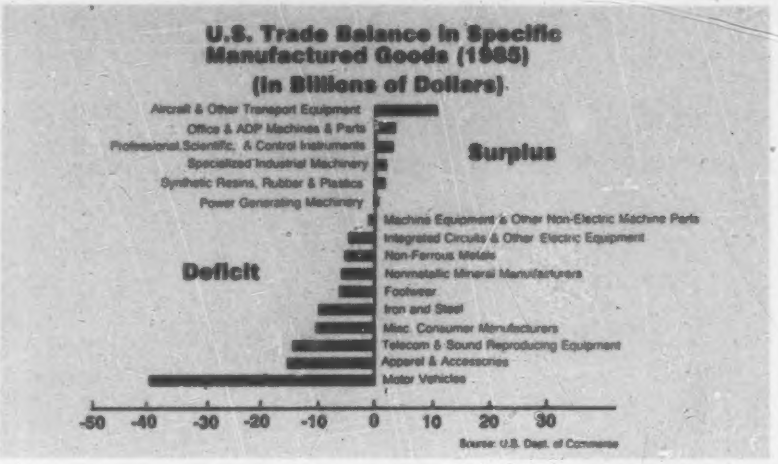
The aftermarket worldwide accounted for 46 pct of F-M's sales but 53 pct of its $131 million profit in 1985.

Timken sells bearings to 90 industries in 150 countries. It's sold to such Pacific Rim nations as South Korea and Taiwan since the end of World War II and today exports between $25 million and $50 million from the U.S. to nations in that region.

"Bearings are important to the growing economies of developing nations, so they are a good market," said John F. Hill, director of bearing marketing in North and South America for the Canton, Ohio-based Timken. Taiwan has no local bearing maker, so Timken has a significant market share there. Korea is a strong market, too.

Timken has been manufacturing bearings in England for more than 50 years and now has nearly half the tapered-bearing market there. The company also has plants in France, Canada, Brazil, Australia, and South Africa. It exports less than 20 pct of its U.S. production, shipping products that are not economical to make abroad.

"We usually must make 100,000 pieces per year of each part for economies of scale," explained Mr. Hill. "Generally 80 pct of our business comes from 20 pct of the parts numbers." Timken's Australian plant makes the 10-20 pct of the parts that comprise 80 pct of the business volume. The other parts are imported.



Source: U.S. Dept. of Commerce

Proprietary Technology

American companies with distinctive technology have scored major successes abroad. The diaphragm carburetors of Walbro Corp. (Cass City, Mich.) are compact units that work in any position. Walbro is manufacturing these products for chain saws and string trimmers in its plants in Japan, Singapore, and Mexico. The company has become the world's largest maker of such small-engine carburetors, supplying 90 pct of the Japanese market and 70 pct of the world market.

Likewise, Walbro makes a distinctive rotary electric fuel pump for automotive fuel-injection systems, supplying both the original equipment and aftermarkets. As automakers around the world use more fuel-injection systems, Walbro's sales of these pumps keep growing.

Last year Walbro formed a joint venture with Champion Spark Plug Co. (Toledo, Ohio) to sell automotive fuel systems in Europe. Champion already sells spark plugs to numerous foreign and domestic vehicle and small equipment makers.

Other success stories abroad include Garrett Corp. (Los Angeles), a leading supplier of turbochargers to automakers in Japan, Europe, and Latin America; and Loctite Corp. (Newington, Conn.), which has the dominant share of the market for industrial and consumer adhesives in Japan. Eaton, which exports about $25 million in truck components from the U.S., has 90 pct of the market for class 8 truck transmissions in Australia.

Korea, China, Taiwan, Singapore, Canada, and Brazil offer perhaps the most attractive prospects for American firms considering exporting or manufacturing abroad. Korean firms are actively seeking U.S. partners and U.S. products in such fields as factory automation. Korean automaker Hyundai has bought Goodyear tires and Libbey-Owens-Ford glass and wants more U.S. parts.

The U.S. continues to do more trade with Canada than with any other nation. In 1985 the U.S. exported $42 billion and imported $51 billion of manufactured goods from Canada.

U.S. companies can receive aid in exporting from the U.S. Dept. of Commerce's International Trade Administration. Exporters to Japan can consider trading firms such as Mitsui & Co., U.S.A. (New York City), which handles $3.5 billion of U.S. exports to Japan each year. The Japan External Trade Organization (Chicago) helps set up ventures between U.S. and Japanese firms.

As U.S. companies step up their exports, they'll have to become more knowledgeable about foreign products and business practices. The alternative is to sit and wait for foreign manufacturers to take over the U.S market. □

MATERIALS PRICES

PRICE & PRODUCTION DATA

(Effective January 5, 1987)

Steel production by districts, thousands of tons
(000 omitted)

	Last Week	Two Weeks Ago	Month Ago	Year Ago
Northeast Coast	131	107	130	157
Pittsburgh	180	148	162	194
Youngstown	105	90	114	85
Lake Erie	105	112	103	113
Detroit	150	143	146	120
Chicago	335	308	338	467
Midwest	159	154	180	156
Southern	144	129	144	196
Western	40	36	42	75
U.S. Production	1,349	1,227	1,359	1,563

Source: American Iron & Steel Institute

Lake Superior Ore Prices

51.50% Fe Natural delivered lower Lake ports unless otherwise stated. Rail transportation, handling and unloading may be charged to buyer. Coarse ore 80¢ premium.

Pellets (per iron unit natural)	gross-ton 58.0*
Pellets (per iron unit natural)	gross-ton 59.4**
Pellets (per iron unit natural)	gross-ton 72.5-86.9***
Mesabi, regular-unscreened	gross-ton 32.53
Mesabi, non-bessemer	gross-ton 30.03-31.53

*58.0¢—Mineral Services, Inc. as of 8/13/85. **59.4¢—Inland Steel Mining, 1/1/85 and Pickands Mather, 8/1/85, delivered hold of vessel, upper Lake ports. ***72.5¢—U.S. Steel as of 8/16/85. 86.9¢—Oglebay Norton 3/25/82; Hanna Mining and Cleveland-Cliffs, 2/26/82.

STEEL PRODUCTION, COMPOSITE PRICES

(Effective January 5, 1987)

U.S. Steel Production	Last Week	Two Weeks Ago	To Date 1986	To Date 1985
Net tons, in thousands	1,349	1,227	—	—
Capability Utilization Rate	55.8	50.7	—	—

Composite Prices	This Week	Week Ago	Month Ago	Year Ago
Finished Steel Base* (¢/lb.—eff. 1/4/87)	25.236	24.951	24.951	24.607
Pig Iron** (Net ton= 2000 lbs.)	$213.00	$213.00	$213.00	$213.00
Scrap No. 1 hvy.*** (Gross ton=2240 lbs.)	$ 76.50	$ 74.50	$ 74.17	$ 73.17
No. 2 bundles	$ 52.17	$ 50.50	$ 50.50	$ 52.83

Scrap Comparison (Gross Ton)

No. 1 steel, Pittsburgh	$ 79.50	$ 79.50	$ 78.50	$ 73.50
No. 1 steel, Philadelphia	71.50	71.50	71.50	71.50
No. 1 steel, Chicago	78.50	72.50	72.50	74.50
No. 1 bundles, Detroit	80.50	75.50	75.50	70.50
Low Phos., Youngstown	79.50	79.50	75.50	73.50
No. 1 mach'y cast., Pgh	74.50	74.50	74.50	68.50
No. 1 mach'y cast., Phila	93.50	93.50	93.50	91.50
No. 1 mach'y cast., Chi	101.50	101.50	101.50	104.50

*Finished Steel Composite: Weighted index of steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

**Pig Iron Composite: Based on average prices for basic and foundry pig iron at representative producing points within the U.S.

***Steel Scrap Composite: Average of No. 1 hvy. melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

NONFERROUS PRICES

(Effective January 5, 1987) Prices obtained in trade based on representative tonnages per gross ton delivered to consumer unless otherwise stated.

Primary Metal Prices

(cents per lb.)	current price	last price	date of change
Aluminum (LME)	51.00	51.70	1/5/87
Copper (C)	64.00	63.50	1/5/87
Lead	28.00	27.50	12/19/86
Magnesium Ingot	153.00	148.00	12/9/85
Nickel (LME)	162.00	160.00	1/5/87
Zinc	47.00	44.50	10/6/86

ALUMINUM: Avg. for last week & previous week. COPPER (C)=cathode. LEAD: common grade. MAGNESIUM: 99.8% pig. delivered. NICKEL: Avg. for last week & previous week. ZINC: high grade.

Antimony, American Laredo, Texas	$2.00
Beryllium-aluminum 5% Be, per lb. contained Be	$248.00
Beryllium-copper, per lb. cont. Be	$152.00
Beryllium 97% powder 200	$196.00
Cadmium, ton lots	$1.50
Calcium, ton lots, crown	$3.92
Chromium, 99.5% electro	$4.62
Cobalt, 99%, cathode	$12.50
Gold, per troy oz.	$403.50
Indium, per troy oz	$2.87
Iridium, per troy oz	$410.00
Magnesium sticks, 10,000 lbs.	$2.02
Mercury, per 76-lb., f.o.b. N.Y.	$210.00-220.00
Molybdenum, lb. tech. moly oxides, 20 lb. MO can	$3.45
Palladium, per troy oz.	$117.00
Platinum, per troy oz.	$484.00
Rhodium, per troy oz.	$1,100.00
Silver ingots, per troy oz.	$5.43
Titanium sponge, melt grade	$3.40-3.55
Tungsten powder, hyd red.	$9.53-9.85
Vanadium	$6.00
Zirconium sponge	$11.00-17.00

(Per lb. unless otherwise noted)

Straits Tin Price

(U.S. cents per lb. EX-SMELTER, based on daily market in Kuala Lumpur in Malaysian dollars per kilo.)

December 29—288.00
December 30—289.50
December 31—290.00
January 1—Holiday
January 2—Holiday

Scrap Prices
Brass Mill Scrap

(Cents per lb.; over 20,000 lbs. add 1¢ per lb.)

	Solids	**Turnings**
Copper	56	51
Yellow brass	49	48½
Red brass	50	46
Comm. bronze	51½	46½
Mang. bronze	39½	38½
Free cutting rod ends	48	47

Custom Smelters Scrap

(Cents per lb., carload lots, del. refinery)

No. 1 copper wire	55
No. 2 copper wire	47
Light copper	41

Ingot Makers Scrap

(Cents per lb., carload lots, del. refinery)

No. 1 copper wire	49
No. 2 copper wire	40
Light copper	33
No. 1 composition	42
No. 1 comp. turnings	42
Hvy. yellow brass solids	29
Hvy. yellow brass turnings	24
Radiators	27

Aluminum

New mixed clips	31 — 32
Old sheet	28 — 29
Old cast	28 — 29
Clean dry borings	29 — 30

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound

Aluminum

Segregated clippings	26 — 27
Mixed L.C. clips	24 — 25
Old sheets and cast	21 — 22
Borings and turnings	17 — 18
Duraluminum clippings	22 — 23

Copper and Brass

No. 1 copper wire	44 — 47
No. 2 copper wire	35 — 36
Light copper	32 — 33
Radiators	22 — 23
No. 1 composition	36 — 37
No. 1 composition turnings	34 — 35
Cocks and faucets	30 — 31
Clean heavy yellow brass	26 — 28
Brass pipe	26 — 27
New soft brass clippings	39 — 40

Lead

Heavy soft lead	9 — 10
Whole batteries	1 — 2
Type metal	17 — 18
Electrotype	14 — 15

Nickel

Nickel solids	100 —110
Nickel rod ends	100 —110
Nickel sheets, clips	100 —110
Nickel turnings	25 — 35

Zinc

New zinc clippings	15 — 16
Old diecast zinc	11 — 12

EFFECTIVE JANUARY 5, 1987

(Effective January 5, 1987) Prices obtained in trade based on representative tonnages per gross ton delivered to consumer unless otherwise stated. Prices are the opinions of Iron Age editors and correspondents, based on contacts with dealers, brokers, generators and users in the industry on the effective date listed above.

Ferrous Scrap Prices

Pittsburgh

No. 1 hvy. melting	$ 79.00 to	$ 80.00
No. 2 hvy. melting	69.00 to	70.00
No. 1 dealer bundles	99.00 to	100.00
No. 1 factory bundles (auto)	100.00 to	101.00
No. 2 bundles	45.00 to	46.00
No. 1 busheling	98.00 to	99.00
Machine shop turnings	8.00 to	9.00
Shoveling turnings	45.00 to	46.00
Cast iron borings	44.00 to	45.00
Low phos. punchings plate	106.00 to	107.00
Heavy turnings	68.00 to	69.00
No. 1 RR hvy. melting	88.00 to	89.00
Rails, 2 ft. and under	97.00 to	98.00
Scrap rails, random lgth	85.00 to	86.00
RR specialties	98.00 to	99.00
No. 1 machinery cast	74.00 to	75.00
Cupola cast	67.00 to	68.00
Heavy breakable cast	30.00 to	31.00
Stainless		
18-8 bundles and solids	485.00 to	495.00
18-8 turnings	385.00 to	395.00

Chicago

No. 1 hvy. melting	$ 78.00 to	$ 79.00
No. 2 hvy. melting	74.00 to	75.00
No. 1 dealer bundles	94.00 to	95.00
No. 1 factory bundles (auto)	97.00 to	98.00
No. 2 dealer bundles	62.00 to	63.00
No. 1 busheling	89.00 to	90.00
Shredder scrap	83.00 to	84.00
Machine shop turnings	22.00 to	23.00
Mixed borings and turnings	14.00 to	15.00
Shoveling turnings	23.00 to	24.00
Cast iron borings	39.00 to	40.00
Low phos. forge crop	94.00 to	95.00
Low phos. punchings plate 1/4 in. and heavier	113.00 to	114.00
Low phos. 2 ft. and under	107.00 to	108.00
No. 1 RR hvy. melting	82.00 to	83.00
Scrap rails random lgth	79.00 to	80.00
Reroller rails	100.00 to	101.00
Rails, 2 ft. and under	94.00 to	95.00
RR couplers and knuckles	79.00 to	80.00
RR car axles	104.00 to	105.00
No. 1 machinery cast	101.00 to	102.00
Cupola cast	89.00 to	90.00
Stove plate	99.00 to	100.00
Steel car wheels	85.00 to	86.00
Stainless		
18-8 bundles and solids	460.00 to	470.00
18-8 turnings	360.00 to	370.00
430 bundles and solids	125.00 to	135.00
430 turnings	85.00 to	95.00

Philadelphia

No. 1 hvy. melting	$ 70.00 to	$ 73.00
No. 2 hvy. melting	62.00 to	65.00
No. 1 dealer bundles	86.00 to	89.00
No. 2 dealer bundles	47.00 to	50.00
No. 1 busheling	85.00 to	88.00
Shredder scrap	84.00 to	87.00
Machine shop turnings	24.00 to	27.00
Mixed borings and turnings	24.00 to	27.00
Shoveling turnings	39.00 to	42.00
Low phos. 5 ft. and under	79.00 to	82.00
Low phos. 2 ft. punchings	91.00 to	94.00
Electric furnace bundles	96.00 to	99.00
RR specialties	81.00 to	84.00
Rails, 2 ft. and under	96.00 to	99.00
Cupola cast	81.00 to	84.00
Heavy breakable cast	52.00 to	55.00
No. 1 machinery cast	92.00 to	95.00

Detroit

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$ 53.00 to	$ 54.00
No. 2 hvy. melting	52.00 to	53.00
No. 1 dealer bundles	80.00 to	81.00
No. 2 bundles	39.00 to	40.00
No. 1 busheling	78.00 to	79.00
Drop forge flashings	44.00 to	45.00
Machine shop turnings	24.00 to	25.00
Mixed borings and turnings	6.00 to	7.00
Shoveling turnings	24.00 to	25.00
Cast iron borings	21.00 to	22.00
Heavy breakable cast	32.00 to	33.00
Mixed cupola cast	47.00 to	48.00
Automobile cast	71.00 to	72.00
Stainless		
18-8 bundles and solids	430.00 to	440.00
18-8 turnings	290.00 to	300.00
430 bundles and solids	115.00 to	125.00

Youngstown

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$ 63.00 to	$ 64.00
No. 2 hvy. melting	61.00 to	62.00
No. 1 dealer bundles	83.00 to	84.00
No. 2 dealer bundles	43.00 to	44.00
Machine shop turnings	17.00 to	18.00
Shoveling turnings	17.00 to	18.00
Low phos. plate	79.00 to	80.00
Electric furnace bundles	68.00 to	69.00
Galvanized bundles	65.00 to	66.00

Cleveland

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 59.00 to	$ 60.00
No. 2 hvy. melting	56.00 to	57.00
No. 1 dealer bundles	86.00 to	87.00
No. 1 factory bundles	87.00 to	88.00
No. 2 bundles	32.00 to	33.00
No. 1 busheling	75.00 to	76.00
Machine shop turnings	17.00 to	18.00
Shoveling turnings	17.00 to	18.00
Cast iron borings	20.00 to	21.00
Cut structural & plates, 5 ft. and under	75.00 to	76.00
Cut structural & plates, 2 ft. and under	96.00 to	97.00
Low phos. punchings plate	96.00 to	97.00
Foundry steel, 2 ft. & under	58.00 to	59.00
No. 1 RR hvy. melting	66.00 to	67.00
Rails, 2 ft. and under	95.00 to	96.00
Rails, 18 in. and under	97.00 to	98.00
No. 1 machinery cast	85.00 to	86.00
Mixed cast	52.00 to	53.00
Stainless		
18-8 bundles	435.00 to	445.00
18-8 turnings	295.00 to	305.00
430 bundles	120.00 to	130.00

Buffalo

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 55.00 to	$ 56.00
No. 2 hvy. melting	45.00 to	46.00
No. 1 busheling	75.00 to	76.00
No. 1 dealer bundles	75.00 to	76.00
No. 2 bundles	32.00 to	33.00
Machine shop turnings	13.00 to	14.00
Mixed borings and turnings	13.00 to	14.00
Shoveling turnings	19.00 to	20.00
Cast iron borings	27.00 to	28.00
Low phos. plate	78.00 to	79.00
Structural and plate, 2 ft. and under	80.00 to	81.00
Rails, 2 ft. and under	79.00 to	80.00
Scrap rails, random lgth	61.00 to	62.00
No. 1 machinery cast	75.00 to	76.00
No. 1 cupola cast	71.00 to	72.00

St. Louis

No. 1 hvy. melting	$ 72.00 to	$ 73.00
No. 2 hvy. melting	61.00 to	62.00
No. 1 busheling	86.00 to	87.00
No. 1 dealer bundles	86.00 to	87.00
No. 2 bundles	57.00 to	58.00
Machine shop turnings	15.00 to	16.00
Shoveling turnings	19.00 to	20.00
Cast iron borings	26.00 to	27.00
No. 1 RR hvy. melting	79.00 to	80.00
Rails, random length	76.00 to	77.00
Rails, 5 ft. and under	91.00 to	92.00
RR specialties	79.00 to	80.00
Cupola cast	66.00 to	67.00
Heavy breakable cast	40.00 to	41.00
Stove plate	85.00 to	86.00
Steel car wheels	85.00 to	86.00
Rerolling rails	99.00 to	100.00
Unstripped motor blocks	49.00 to	50.00

Birmingham

No. 1 hvy. melting	$ 73.00 to	$ 74.00
No. 2 hvy. melting	69.00 to	70.00
No. 1 dealer bundles	73.00 to	74.00
No. 2 bundles	49.00 to	50.00
No. 1 busheling	73.00 to	74.00
Shredder scrap	95.00 to	96.00
Machine shop turnings	25.00 to	26.00
Shoveling turnings	36.00 to	37.00
Cast iron borings	36.00 to	37.00
Electric furnace bundles	69.00 to	70.00
Elec. furnace, 3 ft. & under	75.00 to	76.00
Structural and plate, 2 ft.	92.00 to	93.00
Structural and plate, 4 ft.	83.00 to	84.00
No. 1 RR hvy. melting	83.00 to	84.00
Scrap rails, random lgth	73.00 to	74.00
Rails, 2 ft. and under	93.00 to	95.00
Angles and splice bars	83.00 to	84.00
No. 1 cupola cast	82.00 to	83.00
Unstripped motor blocks	74.00 to	75.00

Cincinnati

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 58.00 to	$ 59.00
No. 2 hvy. melting	53.00 to	54.00
No. 1 dealer bundles	80.00 to	81.00
No. 2 bundles	32.00 to	33.00
Machine shop turnings	11.00 to	12.00
Shoveling turnings	14.00 to	15.00
Cast iron borings	24.00 to	25.00
Low phos. 18 in. and under	83.00 to	84.00
Rails, random length	63.00 to	64.00
Rails, 2 ft. and under	85.00 to	86.00
No. 1 cupola cast	69.00 to	70.00
Heavy breakable cast	29.00 to	30.00
Drop broken cast	74.00 to	75.00

New York

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 38.00 to	$ 40.00
No. 2 hvy. melting	31.00 to	32.00
No. 2 dealer bundles	20.00 to	22.00
Mixed borings and turnings	10.00 to	11.00
Machine shop turnings	4.00 to	6.00
Shoveling turnings	10.00 to	12.00
Clean cast, chem. borings	35.00 to	36.00
No. 1 machinery cast	79.00 to	80.00
Mixed yard cast	50.00 to	51.00
Heavy breakable cast	10.00 to	12.00
Stainless		
18-8 prepared solids	370.00 to	390.00
18-8 turnings	270.00 to	310.00
430 prepared solids	90.00 to	100.00
430 solids	75.00 to	85.00

Boston

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 49.00 to	$ 51.00
No. 2 hvy. melting	39.00 to	41.00
No. 1 dealer bundles	53.00 to	55.00
No. 2 bundles	32.00 to	34.00
No. 1 busheling	56.00 to	58.00
Shredder scrap	59.00 to	61.00
Machine shop turnings	12.00 to	14.00
Shoveling turnings	18.00 to	20.00
No. 1 machinery cast	72.00 to	77.00
Mixed cupola cast	44.00 to	46.00
Heavy breakable cast	8.00 to	10.00

San Francisco

No. 1 hvy. melting	$ 40.00 to	$ 42.00
No. 2 hvy. melting	34.00 to	36.00
No. 1 dealer bundles	31.00 to	33.00
No. 2 dealer bundles	20.00 to	21.00
Machine shop turnings	8.00 to	9.00
Cast iron borings	8.00 to	9.00
No. 1 cupola cast	80.00 to	82.00

Los Angeles

No. 1 hvy. melting	$ 34.00 to	$ 36.00
No. 2 hvy. melting	28.50 to	30.00
No. 1 dealer bundles	26.00 to	28.00
No. 2 dealer bundles	16.00 to	18.00
Machine shop turnings	9.00 to	10.00
Shoveling turnings	10.00 to	11.00
Cast iron borings	8.00 to	9.00
Elec. furnace, 1 ft. and under (foundry)	67.00 to	69.00
No. 1 cupola cast	72.00 to	74.00

Seattle

No. 1 hvy. melting	$ 60.00 to	$ 62.00
No. 2 hvy. melting	51.00 to	53.00
No. 2 bundles	35.00 to	37.00
No. 1 cupola cast	89.00 to	90.00
Mixed yard cast	80.00 to	82.00

Hamilton, Ont.

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 74.00
No. 2 hvy. melting, cut 2 ft. and under	66.00
No. 1 dealer bundles	82.00
No. 2 bundles	58.00
Mixed steel scrap	53.00
Bush. new fact. prep'd	77.00
Bush. new fact. unprep'd	60.00
Machine shop turnings	30.00
Short steel turnings	30.00
Mixed borings and turning	19.00
Cast scrap	97.00

Houston

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 64.00 to	$ 65.00
No. 2 hvy. melting	54.00 to	55.00
No. 2 bundles	33.00 to	34.00
Machine shop turnings	13.00 to	14.00
Crushed turnings	23.00 to	24.00
Shredder scrap	75.00 to	76.00
Cut structural plate, 2 ft. and under	89.00 to	90.00
Cut structural plate, 5 ft. and under	74.00 to	75.00
Unstripped motor blocks	52.00 to	53.00
Cupola cast	83.00 to	84.00

1986 WAS A YEAR OF PRICE DEFLATION

Prices of producers' finished goods were unchanged in December from the month before.

That's the way it has been for a long time now; prices remaining stagnant, or actually falling.

The 'no change' price situation in December followed four months of modest increases. And, for the full year 1986, finished goods prices moved down 2.5 pct.

Too, the price decline last year followed increases of less than 2 pct in each of the three preceding years.

Importantly, tags on capital equipment were right in line with the overall pattern in December; they were unchanged from November. This is clearly shown on the table here.

Why such a soft price year?

Janet Norwood, commissioner of the Bureau of Labor Statistics, cited "dramatic cuts in prices for energy goods" as the "driving force" behind price softness last year.

She noted recent firming in prices for energy goods but added, "I doubt that this development threatens to reaccelerate inflation to double-digit levels in the immediate future."

The commissioner further noted that even with energy goods prices excluded, there existed a "continuing very moderate underlying rate of inflation" last year. Prices for finished goods outside the volatile food and energy sectors rose by less than 3 pct for the fourth consecutive year.

Commissioner Norwood also pointed to the other side of the coin on lower prices.

"Falling prices have constituted a major problem," she explained, "while profit margins for some manufacturing concerns are being seriously restrained by intense foreign competition."

Latest Month Covered: December 1986

Products	Index Reading For Month (1967 = 100)	Pct Change From Previous Month	Pct Change From Year-Ago Month
Metal Cutting Machine Tools	408.2	+ 0.1	+ 3.2
Metal Forming Machine Tools	442.2	– 0.2	+ 1.2
Agricultural Machinery & Equip.	340.0	– 0.1	+ 0.6
Construction Machinery & Equip.	370.7	+ 0.2	+ 2.0
Oil and Gas Field Machinery	410.5	+ 0.1	– 3.5
Industrial Material Handling Equip.	297.7	+ 0.2	+ 0.8
Pumps, Compressors & Allied Equip.	363.9	– 0.2	+ 2.2
Mining Machinery & Equipment	381.3	– 0.1	– 0.1
Mechanical Power Transmission Equip.	349.3	0	+ 3.3
Automobiles	247.7	– 0.7	+ 6.6
Motor Trucks—Light	324.0	– 2.0	+ 3.7
Motor Trucks—Heavy	348.2	+ 0.1	+ 3.8
Railroad Equipment	364.5	0	0
Fabricated Metal Structural Products	316.8	– 0.3	+ 0.6
Electric Motors	352.6	– 0.1	+ 0.4
Valves & Fittings (Dec. 1982 = 100)	107.4	+ 0.1	+ 1.5
Ball & Roller Bearings	355.7	– 0.2	+ 0.7
Foundry & Forge Shop Products	363.3	+ 0.5	– 0.1
Heating Equipment	271.7	+ 0.1	+ 3.7
Plumbing Fixtures & Brass Fittings	322.2	– 0.2	+ 2.4
Metal Containers	362.5	0	+ 0.4
Internal Combustion Engines	353.8	0	+ 1.9

Data based on U.S. Labor Dept.'s Producer Price Index

IRON AGE MARCH 1987

MANUFACTURING MANAGEMENT

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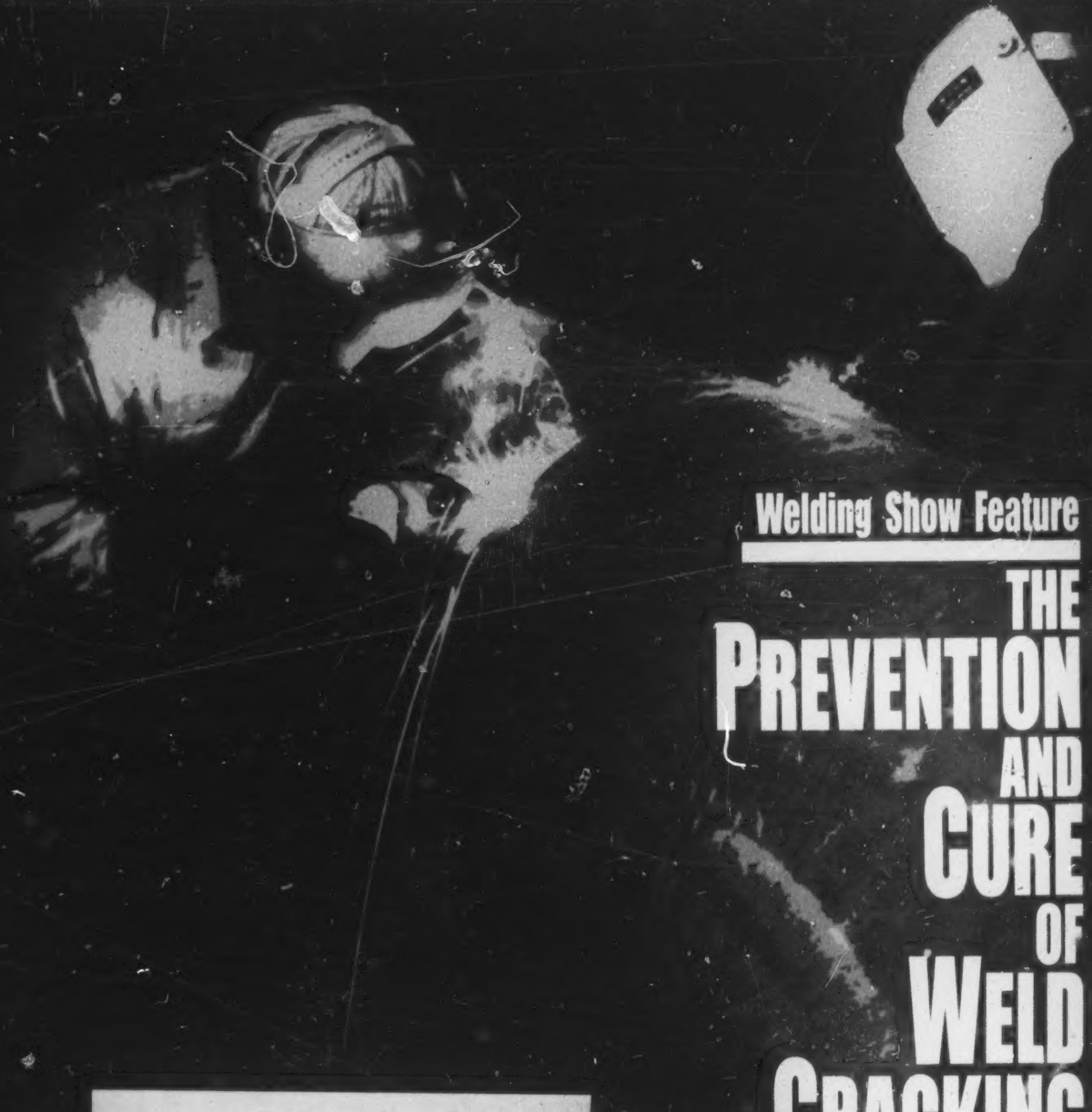

Welding Show Feature

THE PREVENTION AND CURE OF WELD CRACKING

CK0141-------A---00
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Finally, Assembly Costs Come Under the Gun

IRON AGE
MANUFACTURING MANAGEMENT

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Weld Cracking: An awful lot of tender loving weldability has to go into fabricated steel products. If not cared for properly, the consequences can be catastrophic.

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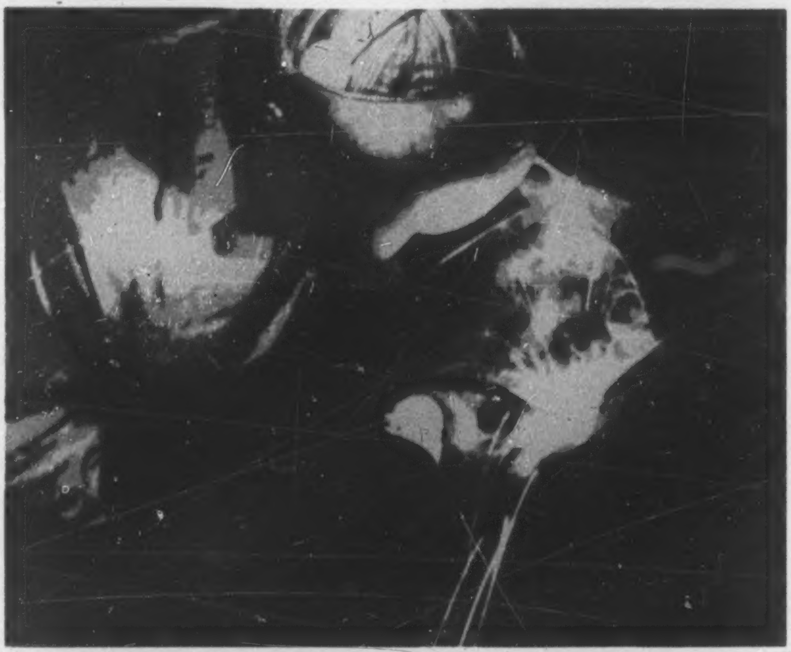

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Chilton
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Advanced Materials: New Tools for Alloy Developers

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PRICE & PRODUCTION DATA

(Effective February 2, 1987)

Steel production by districts, thousands of tons (000 omitted)

	Last Week	Two Weeks Ago	Month Ago	Year Ago
Northeast Coast	119	135	131	179
Pittsburgh	170	171	180	206
Youngstown	110	111	105	112
Lake Erie	111	109	105	130
Detroit	150	150	150	141
Chicago	337	334	335	509
Midwest	163	156	159	172
Southern	138	138	144	227
Western	39	39	40	87
U.S. Production	1,337	1,343	1,349	1,763

Source: American Iron & Steel Institute

Lake Superior Ore Prices

51.50% Fe Natural delivered lower Lake ports unless otherwise stated. Rail transportation, handling and unloading may be charged to buyer. Coarse ore 80¢ premium.

Pellets (per iron unit natural)	gross-ton 58.0*
Pellets (per iron unit natural)	gross-ton 59.4**
Pellets (per iron unit natural)	gross-ton 72.45-86.9***
Mesabi, regular-unscreened	gross-ton 32.53
Mesabi, non-bessemer	gross-ton 30.03-31.53

*58.0¢—Mineral Services, Inc. as of 8/13/85. **59.4¢—Inland Steel Mining, 1/1/85 and Pickands Mather 8/1/85, delivered hold of vessel, upper lake ports. ***72.5¢—U.S. Steel as of 8/16/85. 86.9¢—Oglebay Norton 3/25/82. Hanna Mining and Cleveland-Cliffs 2/26/82.

STEEL PRODUCTION, COMPOSITE PRICES

(Effective February 2, 1987)

U.S. Steel Production	Last Week	Two Weeks Ago	To Date 1986	To Date 1985
Net tons, in thousands	1,337	1,343	5,934	7,647
Capability Utilization Rate	58.4	58.7	58.6	69.2

Composite Prices	This Week	Week Ago	Month Ago	Year Ago
Finished Steel Base* (¢/lb —eff. 1/4/87)	25.236	25.236	24.951	24.607
Pig Iron** (Net ton= 2000 lbs.)	$213.00	$213.00	$213.00	$213.00
Scrap No. 1 hvy.*** (Gross ton=2240 lbs.)	$ 77.50	$ 75.83	$ 76.50	$ 75.50
No. 2 bundles	$ 51.17	$ 51.17	$ 52.17	$ 53.83

Scrap Comparison (Gross Ton)

	This Week	Week Ago	Month Ago	Year Ago
No. 1 steel, Pittsburgh	$ 82.50	$ 79.50	$ 79.50	$ 76.50
No. 1 steel, Philadelphia	71.50	69.50	71.50	72.50
No. 1 steel, Chicago	78.50	78.50	78.50	77.50
No. 1 bundles, Detroit	85.50	85.50	80.50	70.50
Low Phos., Youngstown	82.50	79.50	79.50	76.50
No. 1 mach'y cast, Pgh	74.50	74.50	74.50	68.50
No. 1 mach'y cast, Phila	93.50	93.50	93.50	92.50
No. 1 mach'y cast, Chi	101.50	101.50	101.50	109.50

*Finished Steel Composite: Weighted index of steel bars, shapes, plates, wire rods, black pipe, hot and cold rolled sheets and strips.

**Pig Iron Composite: Based on average prices for basic and foundry pig iron of representative producing points within the U.S.

***Steel Scrap Composite: Average of No. 1 hvy. melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

NONFERROUS PRICES

(Effective February 2, 1987) Prices obtained in trade based on representative tonnages per gross ton delivered to consumer unless otherwise stated.

Primary Metal Prices

(cents per lb.)	current price	last price	date of change
Aluminum (LME)	54.60	52.80	2/2/87
Copper (C)	64.50	64.00	1/26/87
Lead	26.00	27.00	2/2/87
Magnesium Ingot	153.00	148.00	12/9/85
Nickel (LME)	167.00	162.00	1/26/87
Zinc	47.00	44.50	10/6/86

ALUMINUM: Avg. for last week & previous week. COPPER: (C)=cathode. LEAD: common grade. MAGNESIUM: 99.8% pig delivered. NICKEL: Avg. for last week & previous week. ZINC: high grade.

Antimony, American Laredo, Texas	$2.00
Beryllium-aluminum 5% Be, per lb. contained Be	$248.00
Beryllium-copper, per lb. cont. Be	$152.00
Beryllium 97% powder 200	$229.00
Cadmium, ton lots	$1.50
Calcium, ton lots, crown	$3.92
Chromium, 99.5% electro	$4.62
Cobalt, 99%, cathode	$12.50
Gold, per troy oz	$420.00
Indium, per troy oz	$2.87
Iridium, per troy oz	$411.00
Magnesium sticks, 10,000 lbs	$2.02
Mercury, per 76-lb., f.o.b. N.Y.	$212.00-225.00
Molybdenum, lb. tech. moly oxides, 20 lb. MO can	$3.45
Palladium, per troy oz	$124.00
Platinum, per troy oz	$529.00
Rhodium, per troy oz	$1,162.00
Silver ingots, per troy oz	$5.51
Titanium sponge, melt grade	$3.40-3.55
Tungsten powder, hyd. red	$9.53-9.85
Vanadium	$6.00
Zirconium sponge	$11.00-17.00

(Per lb. unless otherwise noted)

Straits Tin Price

(U.S. cents per lb. EX-SMELTER based on daily market in Kuala Lumpur in Malaysian dollars per kilo.)

January 26—301.00
January 27—301.00
January 28—302.00
January 29 Holiday
January 30 Holiday

Scrap Prices
Brass Mill Scrap

(Cents per lb., over 20,000 lbs. add 1¢ per lb.)

	Solids	Turnings
Copper	55½	50½
Yellow brass	48	47½
Red brass	49	45
Comm. bronze	50½	45½
Mang. bronze	38½	37½
Free cutting rod ends	47	46

Custom Smelters Scrap

(Cents per lb., carload lots, del. refinery)

No. 1 copper wire	54
No. 2 copper wire	46
Light copper	40

Ingot Makers Scrap

(Cents per lb., carload lots, del. refinery)

No. 1 copper wire	48
No. 2 copper wire	39
Light copper	32
No. 1 composition	41
No. 1 comp. turnings	41
Hvy. yellow brass solids	28
Hvy. yellow brass turnings	23
Radiators	26

Aluminum

New mixed clips	32	— 33
Old sheet	29	— 30
Old cast	29	— 30
Clean dry borings	30	— 31

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Aluminum

Segregated clippings	28	— 29
Mixed L.C. clips	26	— 27
Old sheets and cast	23	— 24
Borings and turnings	19	— 20
Duraluminum clippings	24	— 25

Copper and Brass

No. 1 copper wire	43	— 46
No. 2 copper wire	34	— 35
Light copper	31	— 32
Radiators	21	— 22
No. 1 composition	35	— 36
No. 1 composition turnings	33	— 34
Cocks and faucets	29	— 30
Clean heavy yellow brass	25	— 27
Brass pipe	25	— 26
New soft brass clippings	38	— 39

Lead

Heavy soft lead	8	— 9
Whole batteries	1	— 2
Type metal	17	— 18
Electrotype	14	— 15

Nickel

Nickel solids	100	—110
Nickel rod ends	100	—110
Nickel sheets, clips	100	—110
Nickel turnings	25	— 35

Zinc

New zinc clippings	14	— 15
Old diecast zinc	10	— 11

EFFECTIVE FEBRUARY 2, 1987

(Effective February 2, 1987) Prices obtained in trade based on representative tonnages per gross ton delivered to consumer unless otherwise stated. Prices are the opinions of Iron Age editors and correspondents, based on contacts with dealers, brokers, generators and users in the industry on the effective date listed above.

Ferrous Scrap Prices

Pittsburgh

No. 1 hvy. melting	$ 82.00 to	$ 83.00
No. 2 hvy. melting	72.00 to	73.00
No. 1 dealer bundles	104.00 to	105.00
No. 1 factory bundles (auto)	107.00 to	108.00
No. 2 bundles	45.00 to	46.00
No. 1 busheling	104.00 to	105.00
Machine shop turnings	8.00 to	9.00
Shoveling turnings	46.00 to	47.00
Cast iron borings	45.00 to	46.00
Low phos. punchings plate	107.00 to	108.00
Heavy turnings	72.00 to	73.00
No. 1 RR hvy. melting	86.00 to	87.00
Rails, 2 ft. and under	98.00 to	99.00
Scrap rails, random lgth	86.00 to	87.00
RR specialties	99.00 to	100.00
No. 1 machinery cast	74.00 to	75.00
Cupola cast	67.00 to	68.00
Heavy breakable cast	30.00 to	31.00
Stainless		
18-8 bundles and solids	475.00 to	485.00
18-8 turnings	375.00 to	385.00

Chicago

No. 1 hvy. melting	$ 78.00 to	$ 79.00
No. 2 hvy. melting	74.00 to	75.00
No. 1 dealer bundles	99.00 to	100.00
No. 1 factory bundles (auto)	102.00 to	103.00
No. 2 dealer bundles	62.00 to	63.00
No. 1 busheling	89.00 to	90.00
Shredder scrap	83.00 to	84.00
Machine shop turnings	24.00 to	25.00
Mixed borings and turnings	16.00 to	17.00
Shoveling turnings	25.00 to	26.00
Cast iron borings	40.00 to	41.00
Low phos. forge crop	95.00 to	96.00
Low phos. punchings plate 1/4 in. and heavier	115.00 to	116.00
Low phos. 2 ft. and under	108.00 to	109.00
No. 1 RR hvy. melting	82.00 to	83.00
Scrap rails random lgth	79.00 to	80.00
Reroller rails	100.00 to	101.00
Rails, 2 ft. and under	94.00 to	95.00
RR couplers and knuckles	79.00 to	80.00
RR car axles	104.00 to	105.00
No. 1 machinery cast	101.00 to	102.00
Cupola cast	89.00 to	90.00
Stove plate	99.00 to	100.00
Steel car wheels	85.00 to	86.00
Stainless		
18-8 bundles and solids	450.00 to	460.00
18-8 turnings	350.00 to	360.00
430 bundles and solids	125.00 to	135.00
430 turnings	85.00 to	95.00

Philadelphia

No. 1 hvy. melting	$ 70.00 to	$ 73.00
No. 2 hvy. melting	62.00 to	65.00
No. 1 dealer bundles	86.00 to	89.00
No. 2 dealer bundles	44.00 to	47.00
No. 1 busheling	83.00 to	86.00
Shredder scrap	84.00 to	87.00
Machine shop turnings	24.00 to	27.00
Mixed borings and turnings	24.00 to	27.00
Shoveling turnings	39.00 to	42.00
Low phos. 5 ft. and under	72.00 to	75.00
Low phos. 2 ft. punchings	91.00 to	94.00
Electric furnace bundles	99.00 to	100.00
RR specialties	80.00 to	83.00
Rails, 2 ft. and under	96.00 to	99.00
Cupola cast	80.00 to	83.00
Heavy breakable cast	52.00 to	55.00
No. 1 machinery cast	92.00 to	95.00

Detroit

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 54.00 to	$ 55.00
No. 2 hvy. melting	53.00 to	54.00
No. 1 dealer bundles	85.00 to	86.00
No. 2 bundles	41.00 to	42.00
No. 1 busheling	83.00 to	84.00
Drop forge flashings	44.00 to	45.00
Machine shop turnings	24.00 to	25.00
Mixed borings and turnings	6.00 to	7.00
Shoveling turnings	24.00 to	25.00
Cast iron borings	21.00 to	22.00
Heavy breakable cast	32.00 to	33.00
Mixed cupola cast	47.00 to	48.00
Automobile cast	71.00 to	72.00
Stainless		
18-8 bundles and solids	430.00 to	440.00
18-8 turnings	290.00 to	300.30
430 bundles and solids	115.00 to	125.00

Youngstown

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 66.00 to	$ 67.00
No. 2 hvy. melting	63.00 to	64.00
No. 1 dealer bundles	89.00 to	90.00
No. 2 dealer bundles	45.00 to	46.00
Machine shop turnings	18.00 to	19.00
Shoveling turnings	18.00 to	19.00
Low phos. plate	82.00 to	83.00
Electric furnace bundles	73.00 to	74.00
Galvanized bundles	70.00 to	71.00

Cleveland

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 62.00 to	$ 63.00
No. 2 hvy. melting	59.00 to	60.00
No. 1 dealer bundles	91.00 to	92.00
No. 1 factory bundles	92.00 to	93.00
No. 2 bundles	34.00 to	35.00
No. 1 busheling	80.00 to	81.00
Machine shop turnings	17.00 to	18.00
Shoveling turnings	17.00 to	18.00
Cast iron borings	20.00 to	21.00
Cut structural & plates 5 ft. and under	79.00 to	80.00
Cut structural & plates 2 ft. and under	99.00 to	100.00
Low phos. punchings plate	99.00 to	100.00
Foundry steel, 2 ft. & under	60.00 to	61.00
No. 1 RR hvy. melting	68.00 to	69.00
Rails, 2 ft. and under	100.00 to	101.00
Rails, 18 in. and under	102.00 to	103.00
No. 1 machinery cast	85.00 to	86.00
Mixed cast	52.00 to	53.00
Stainless		
18-8 bundles	435.00 to	445.00
18-8 turnings	295.00 to	305.00
430 bundles	120.00 to	130.00

Buffalo

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 57.00 to	$ 58.00
No. 2 hvy. melting	47.00 to	48.00
No. 1 busheling	81.00 to	82.00
No. 1 dealer bundles	81.00 to	82.00
No. 2 bundles	32.00 to	33.00
Machine shop turnings	13.00 to	14.00
Mixed borings and turnings	13.00 to	14.00
Shoveling turnings	19.00 to	20.00
Cast iron borings	27.00 to	28.00
Low phos. plate	82.00 to	83.00
Structural and plate 2 ft. and under	84.00 to	85.00
Rails, 2 ft. and under	81.00 to	82.00
Scrap rails, random lgth	63.00 to	64.00
No. 1 machinery cast	76.00 to	77.00
No. 1 cupola cast	71.00 to	72.00

St. Louis

No. 1 hvy. melting	$ 74.00 to	$ 75.00
No. 2 hvy. melting	61.00 to	62.00
No. 1 busheling	88.00 to	89.00
No. 1 dealer bundles	89.00 to	90.00
No. 2 bundles	57.00 to	58.00
Machine shop turnings	17.00 to	18.00
Shoveling turnings	21.00 to	22.00
Cast iron borings	26.00 to	27.00
No. 1 RR hvy. melting	83.00 to	84.00
Rails, random length	76.00 to	77.00
Rails, 5 ft. and under	91.00 to	92.00
RR specialties	83.00 to	84.00
Cupola cast	66.00 to	67.00
Heavy breakable cast	40.00 to	41.00
Stove plate	85.00 to	86.00
Steel car wheels	85.00 to	86.00
Rerolling rails	99.00 to	100.00
Unstripped motor blocks	49.00 to	50.00

Birmingham

No. 1 hvy. melting	$ 73.00 to	$ 74.00
No. 2 hvy. melting	69.00 to	70.00
No. 1 dealer bundles	73.00 to	74.00
No. 2 bundles	49.00 to	50.00
No. 1 busheling	73.00 to	74.00
Shredder scrap	95.00 to	96.00
Machine shop turnings	28.00 to	29.00
Shoveling turnings	39.00 to	40.00
Cast iron borings	36.00 to	37.00
Electric furnace bundles	69.00 to	70.00
Elec. furnace, 3 ft. & under	75.00 to	76.00
Structural and plate, 2 ft.	94.00 to	95.00
Structural and plate, 4 ft.	86.00 to	87.00
No. 1 RR hvy. melting	86.00 to	87.00
Scrap rails, random lgth	80.00 to	81.00
Rails, 2 ft. and under	97.00 to	98.00
Angles and splice bars	86.00 to	87.00
No. 1 cupola cast	82.00 to	83.00
Unstripped motor blocks	74.00 to	75.00

Cincinnati

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 60.00 to	$ 61.00
No. 2 hvy. melting	53.00 to	54.00
No. 1 dealer bundles	85.00 to	86.00
No. 2 bundles	32.00 to	33.00
Machine shop turnings	11.00 to	12.00
Shoveling turnings	14.00 to	15.00
Cast iron borings	24.00 to	25.00
Low phos. 18 in. and under	85.00 to	86.00
Rails, random length	65.00 to	66.00
Rails, 2 ft. and under	85.00 to	86.00
No. 1 cupola cast	69.00 to	70.00
Heavy breakable cast	29.00 to	30.00
Drop broken cast	74.00 to	75.00

New York

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 38.00 to	$ 40.00
No. 2 hvy. melting	31.00 to	32.00
No. 2 dealer bundles	20.00 to	22.00
Mixed borings and turnings	10.00 to	11.00
Machine shop turnings	4.00 to	6.00
Shoveling turnings	10.00 to	12.00
Clean cast, chem. borings	35.00 to	36.00
No. 1 machinery cast	79.00 to	80.00
Mixed yard cast	50.00 to	51.00
Heavy breakable cast	10.00 to	12.00
Stainless		
18-8 prepared solids	370.00 to	390.00
18-8 turnings	270.00 to	310.00
430 prepared solids	90.00 to	100.00
430 solids	75.00 to	85.00

Boston

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 49.00 to	$ 51.00
No. 2 hvy. melting	39.00 to	41.00
No. 1 dealer bundles	53.00 to	55.00
No. 2 bundles	32.00 to	34.00
No. 1 busheling	56.00 to	58.00
Shredder scrap	59.00 to	61.00
Machine shop turnings	12.00 to	14.00
Shoveling turnings	18.00 to	20.00
No. 1 machinery cast	72.00 to	77.00
Mixed cupola cast	44.00 to	46.00
Heavy breakable cast	8.00 to	10.00

San Francisco

No. 1 hvy. melting	$ 40.00 to	$ 42.00
No. 2 hvy. melting	34.00 to	36.00
No. 1 dealer bundles	31.00 to	33.00
No. 2 dealer bundles	20.00 to	21.00
Machine shop turnings	8.00 to	9.00
Cast iron borings	8.00 to	9.00
No. 1 cupola cast	80.00 to	82.00

Los Angeles

No. 1 hvy. melting	$ 34.00 to	$ 36.00
No. 2 hvy. melting	28.00 to	30.00
No. 1 dealer bundles	26.00 to	28.00
No. 2 dealer bundles	16.00 to	18.00
Machine shop turnings	9.00 to	10.00
Shoveling turnings	10.00 to	11.00
Cast iron borings	8.00 to	9.00
Elec. furnace, 1 ft. and under (foundry)	67.00 to	69.00
No. 1 cupola cast	72.00 to	74.00

Seattle

No. 1 hvy. melting	$ 60.00 to	$ 62.00
No. 2 hvy. melting	51.00 to	53.00
No. 2 bundles	35.00 to	37.00
No. 1 cupola cast	89.00 to	90.00
Mixed yard cast	80.00 to	82.00

Hamilton, Ont.

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 74.00
No. 2 hvy. melting, cut 2 ft. and under	66.00
No. 1 dealer bundles	82.00
No. 2 bundles	58.00
Mixed steel scrap	53.00
Bush. new fact. prep'd	77.00
Bush. new fact. unprep'd	60.00
Machine shop turnings	30.00
Short steel turnings	30.00
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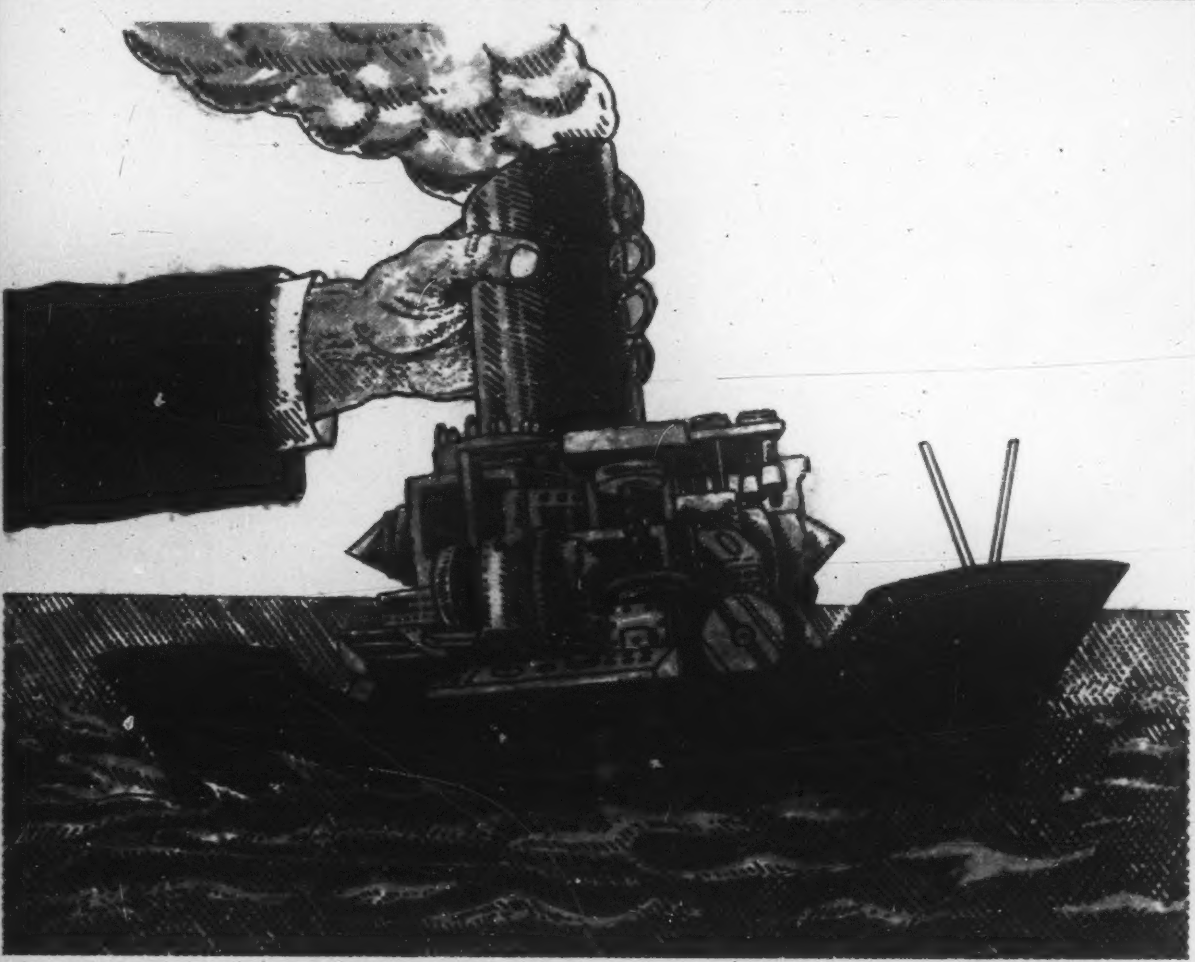

WILL TRADE PACTS HELP MACHINE TOOL BUILDERS?

Though the Commerce Department says the restraint agreements will bolster the U.S. builders' share of the market, few in industry see little improvement in orders this year.

Even though it took years to win its fight against imports, the domestic machine tool industry shouldn't expect any immediate miracles from the Reagan Administration's new limits on foreign machine tools, financial experts contend.

And, industry observers contend the domestic machine tool builders are going to have major problems because of the Tax Reform Act of 1986 and a stagnant market for machine tools.

Voluntary Restraint Agreements (VRAs) on machine tool imports from Japan and Taiwan and import restrictions on machine tools from Switzerland and West Germany were announced late last year with much fanfare by the U.S. Department of Commerce and the White House. That action came after years of lobbying by domestic machine tool interests, and months of inside fighting by members of the Reagan Administration.

Essentially, representatives of the machine tool industry wanted imports rolled back to the levels of the early 1980s because foreign machine tools continued to capture larger shares of the U.S. market and posed a real threat to the continued profitability of the domestic industry. To force action on the issue, several years ago the domestic industry filed formal pe-

Fewer Machine Tools From the Far East. . .

Japan

	1985	1986*	1987	Net Change**	Pct Change
NC Lathes	3691	3835	3592	−243	−6.3
Non-NC Lathes	437	719	359	−360	−50.1
Mach. Centers	3735	3389	2436	−953	−28.1
Milling Mach.	4852	333	476	+143	+42.9
NC P&S	424	415	146	−269	−64.8
Non-NC P&S	421	449	450	+1	+0.2
Total	9190	9140	7459	−1681	−18.4

Taiwan

	1985	1986*	1987	Net Change**	Pct Change
NC Lathes	180	504	202	−302	−59.9
Non-NC Lathes	2766	2355	1842	−513	−21.8
Mach. Centers	238	348	220	−128	−36.8
Milling Mach.	3929	3083	2915	−168	−5.4
Total	7113	6290	5179	−1111	−17.7

. . . But Little Change in Imports From Europe

West Germany

	1985	1986*	1987	Net Change**	Pct Change
NC Lathes	150	180	169	−11	−6.1
Non-NC Lathes	311	171	255	+84	+49.1
Mach. Centers	81	127	75	−52	−40.9
NC P&S	33	40	25	−15	−37.5
Non-NC P&S	453	385	389	+4	+1.0
Total	1028	903	913	+10	+1.1

Switzerland

	1985	1986*	1987	Net Change**	Pct Change
NC-P&S	72	56	55	−1	−1.8

* Annualized nine months 1986 figures

** Net change from 1986 to 1987

Source: U.S. Commerce Dept.

titions with the government to limit those imports.

Meanwhile, the real battle within the Reagan Administration started in late 1985, when some officials became alarmed because machine tool imports rose from 26.4 pct to 43 pct of the U.S. market in only a few years.

They were worried about the national security problems with a feeble U.S. machine tool industry if the country fought a long term war. They were also worried about the shrinking industrial base of the defense industry at a time when Japanese machine tool makers had tripled their U.S. market from $535 million to $1.5 billion, and Taiwanese and European manufacturers were also getting larger shares of the U.S. market.

Facing those national security problems, Commerce Secretary Malcolm Baldrige and Defense Secretary Caspar Weinberger teamed up to push the idea of forcing a cutback of 90 pct of foreign machine tools to keep the U.S. industry ready to meet a national emergency. However, they soon ran up against U.S. Trade Representative Clayton Yeutter and other ardent free traders in the Administration, and President Reagan was convinced to take a softer position.

In the end, U.S. trade negotiators threatened the Japanese and Taiwanese with 25-year-old Federal trade laws to cut back the imports, and those governments made some concessions on their machine tool exports.

The final agreement itself was complex, but a Commerce Department report breaks it down into these main components:

•First, the department found that imports represented a threat to U.S. national security in seven of 18 machine tool product categories. Specifically, it mentioned imports of machining centers, vertical numerically controlled lathes, horizontal numerically controlled (NC) lathes, non-numerically controlled (non-NC) lathes, milling machines, and numerically controlled and non-numerically controlled punching and shearing machines.

•Based on these findings, specific agreements were reached in each of the seven product categories. For example, the Japanese agreed to 1987 market levels of 7,459 units, including: 3,592 NC lathes, 359 non-NC lathes, 2,436 machining centers, 476 milling machines, 146 NC punching and shearing machines, and 450 non-NC punching and shearing machines.

•For Taiwan, the 1987 market levels will be a total of 5,179 units, including: 202 NC lathes, 1,842 non-NC lathes, 2,915 milling machines, and 220 machining centers.

•Meanwhile, the restraints placed on West Germany would allow that country to export only 913 units to the U.S., including: 389 non-NC punching and shearing machines, 169 NC lathes, 255 non-NC lathes, 75 machining centers, and 25 NC punching and shearing machines.

•In a much smaller category, the department reported that Switzerland had agreed to send only 55 NC punching and shearing machines.

In addition to those agreements, Commerce officials told several other countries not to try to fill the void left by the import restrictions. While the department did not officially announce those countries, the American Machine Tool Distributors' Association (AMTDA) said the countries are believed to be Great Britain, Spain, Italy, Sweden, Brazil, South Korea, and Singapore.

Japan and Taiwan

While making optimistic predictions about the effect of these restrictions, the Commerce Department noted that the two biggest exporters to the U.S., Japan and Taiwan, agreed to limit their exports for five years, beginning this January. And, it said, the combined effect of those restrictions could create for U.S. machine tool makers new market opportunities of about 3,300 units this year. In 1985, those machines were imported at a value of about $155 million.

In addition, the department said, over the next five years of import restrictions, U.S. machine tool makers could increase domestic sales by about 16,500 units, and the imported values of these machines would be $775 million.

In a letter to its membership, AMTDA said of the Commerce Department's projections: "These additional sales would represent an overall market share increase of 35 pct to 44 pct for this portion of the U.S. machine tool industry. The Department of Commerce also believes that the VRAs will preserve employment in the U.S. machine tool industry."

It added, "If the industry continued to lose jobs at its current rate, it would lose about 10,700 workers over the next five years. The VRAs will help ensure that jobs remain in the U.S. The Department of Commerce also believes that increases in the capacity utilization and additional revenues of the U.S. machine tool industry would permit more investment in research development and research facilities. The Commerce Department estimated that new investments in plant and equipment could total $150 million over the five-year period."

In announcing the agreements, President Reagan was optimistic, saying, "The revitalization of the domestic machine tool industry is primarily the industry's own responsibility. However, for national security purposes, the government has a role in facilitating the industry's recovery effort."

Mr. Reagan noted that Japan and Taiwan voluntarily agreed to reduce their imports to the U.S. for five years, while the U.S. had to place limits on the imports from Switzerland and West Germany.

Regarding those European nations, Mr. Reagan said, "I have directed the Department of Commerce and the U.S. Customs Service to monitor machine tool imports to determine whether these limits are being exceeded. If we determine that exports of these machine tools exceed these limits and undermine the integrity of the machine tool revitalization program, I am prepared to take unilateral action under U.S. law."

And, Mr. Reagan also outlined these additional steps to help the domestic industry:

- Requiring the Defense Department to work with the Commerce Department to "help integrate the domestic industry more fully into the defense procurement process by providing the industry with more timely information about defense programs and future procurement requirements."
- Linking the domestic industry with defense programs "to improve manufacturing technology," providing up to $5 million in Defense Department funds for research on manufacturing, and then sharing that research with companies in the industry.
- And, Mr. Reagan promised to develop a special training pro-

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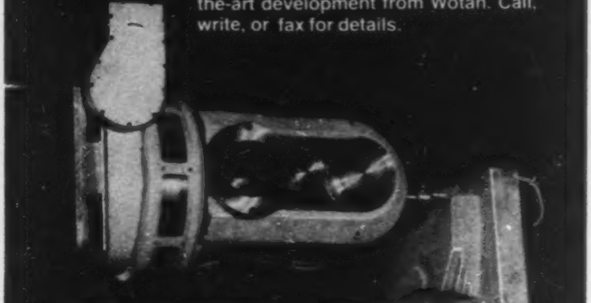

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gram for machine tool operators, engineers and managers, and to help firms that want to start cooperative R&D projects.

However, despite those predictions, the Commerce Department also furnished other figures that showed restricting the imports would not be as sweeping an action as the President and his cabinet officers had indicated.

For example, in 1986 the Japanese sent an estimated 9,140 units to the U.S., and that would drop to the 7,459 units this year. That was a total decrease of 18.4 pct not nearly in the range of the 90 pct first advocated by Secretary Baldrige. And, while the Japanese had agreed to reduce their exports of machining centers to the U.S. by 953, the agreement also called for allowing that nation to boost its exports of milling machines by 143.

The reductions for Taiwan followed a similar pattern, dropping from an estimated 6,290 units in 1986 to the 5,179 machine tools this year, a decrease of 17.7 pct.

In addition, although West Germany must cut back its machining centers sent to the U.S. by 40.9 pct this year, it would also be allowed to ship 49.1 pct more non-NC lathes. In this case, the net result is that West Germany's machine tool exports to this country will actually grow from 903 in 1986 to 913 this year, a boost of 1.1 pct. Meanwhile, the imports from Switzerland will have a minimal impact since that country sent the U.S. 56 machine tools last year and can send 55 this year, a decrease of 1.8 pct.

Little Impact

In the weeks since these measures were announced, industry experts have been analyzing them for their impact on domestic machine tool makers.

One industry economist who studied the situation came to this conclusion: "Despite all the talk, this isn't going to have a major impact on the U.S. industry. Those reductions will help, but they won't turn the industry

Foreign Builders Take a Big Slice of a Smaller Pie

Machine tool orders for January fell 23 pct to $147.8 million from $190.8 million in January 1986, according to the National Machine Tool Builders' Association (NMTBA).

January orders for lathes, milling machines, machining centers, grinders, boring mills and other machinery used to shape metal by cutting totaled $99.9 million, down 26 pct from $135 million a year earlier, NMTBA reported last month. That broke down to $88 million in those orders for domestic machine tools and $11.9 million for foreign products.

Meanwhile, orders in December were $87.2 million, with domestic manufacturers getting $74 million of business and the foreign market taking $13.2 million.

A year earlier, the domestic market was $124.75 million, while the foreign market totaled $10.25 million.

Orders in January for metal-forming presses and other machinery used to shape metal with pressure totaled $47.9 million, which was 14 pct below the $55.8 million of January 1986, the trade group also reported.

The domestic market for metal-forming machine tools was $33 million in January, with foreign competition getting $14.85 million. In January 1986, the domestic industry got $50.2 milion in those orders, while foreign competition received orders for $5.5 million of the products.

The January figures in this segment of the market were slightly below the $49.3 million in orders received in December, with U.S. manufacturers getting $37 million in new business and foreign machine tool companies with $12.25 million in new business.

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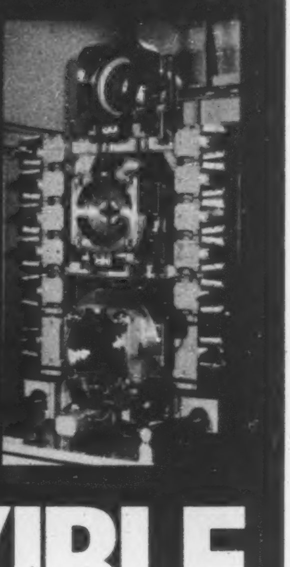

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around. Only a major surge in manufacturing will do that."

At the same time, a company spokesman for Cincinnati Milacron, Inc., would say only that the company hoped the VRAs would be beneficial for the machine tool industry, but it was too early to make more specific predictions.

Eli Lustgarten, an industry analyst with Paine Webber, discounted a major impact from the import limits, saying, "The real problem with the machine tool industry is a lack of demand."

Current demand for machine tools is very much lower than in 1980 or 1981, he said, and on a worldwide basis there is a large inventory of unsold machine tools.

As for the immediate effect of the import limits, he said it was "too early to tell," and that there was a potential shrinkage of the machine tool market for the latter part of this year and into 1988. Demand might improve, he said, toward the end of the decade.

While the import limitations made a political splash in Washington, Ralph Nappi, AMTDA's director of management services, said his association's membership is taking a wait-and-see attitude about how they will affect the domestic machine tool distribution business.

He said the trade group's members "don't seem that excited" about the restraints, and that about 75 pct of AMTDA members responding to a survey about issues important to them said they didn't know of the VRAs' impact or felt they would have little practical impact.

Many of the distributors, Mr. Nappi said, felt "this was just another thing that occurred and they would have to live with it."

Meanwhile, the domestic machine tool industry came into this year with financial problems. Orders for December 1986 for U.S.-made machine tools fell 22 pct from a year earlier, according to the National Machine Tool Builders' Association (NMTBA). At the same time, the trade group reported that orders last year dropped 16 pct from 1985 and that the year-end backlog of unfilled orders was down 28 pct from 1985 levels.

NMTBA also said machine tool orders for all of 1986 were $2.12 billion, compared with $2.53 billion for 1985 and $2.92 billion for 1984. In addition, year-end backlogs were $1.20 billion, down from $1.67 billion at the end of 1985. Machine tool shipments in December were $271.9 million, down 27 pct from a year earlier, and orders for lathes, machining centers, milling machines, grinders, boring mills and other machines used to shape metal through cutting totaled $86.8 million in December. That was a drop of 26 pct from $116.6 million a year earlier, while orders were up from $84 million in November.

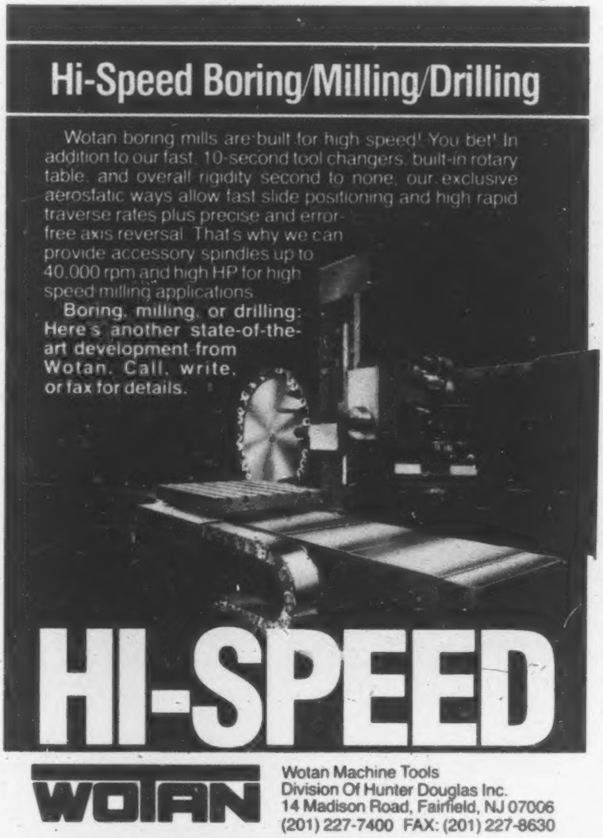
In another area, December orders for metal-forming presses and other machines used to shape metal through pressure totaled $49.3 million, down 16 pct from $58.5 million a year earlier, and December orders in this area were up only 1.3 pct from November.

Industry officials attributed much of this slump to the effects of some provisions of the Tax Reform Act of 1986.

That law eliminated a provision giving businesses a 10 pct tax credit for the purchase of many capital items. In addition, the bill has much less generous provisions for depreciation of major equipment items, and it eliminated the tax credit for most capital goods, retroactive to Jan. 1, 1986.

NMTBA President James Gray said the tax bill had hurt investments in machine tools, adding, "We hope that, as the negative results of eliminating investment incentives become more clear, the need to reinstate tax provisions that encourage growth will also become more clear."

By Whitt Flora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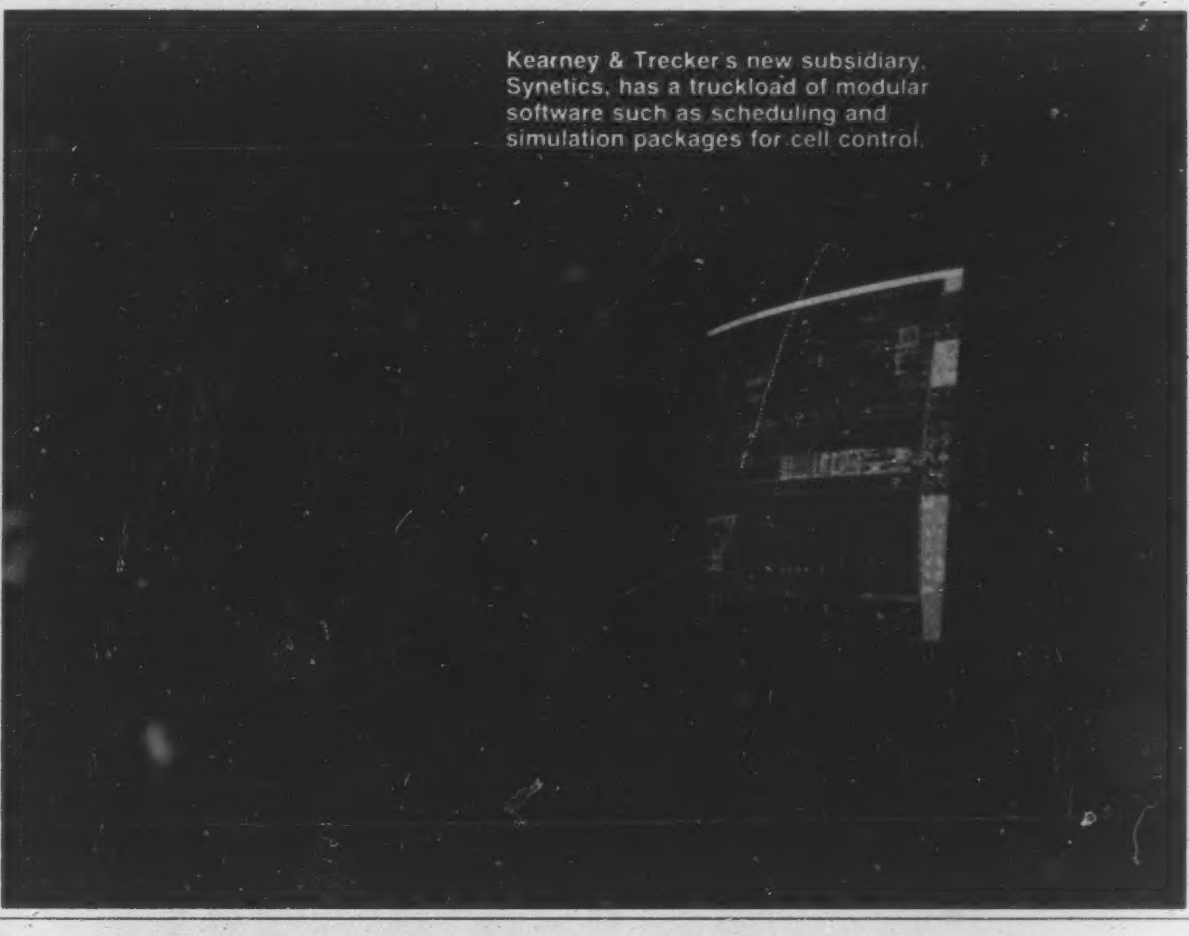


Kearney & Trecker's new subsidiary, Synetics, has a truckload of modular software such as scheduling and simulation packages for cell control.

HERE COME THE CELLS AND CELL CONTROLLERS

To stay afloat in waters infested by new competition and changing markets, companies are abandoning automation for integration, or more specifically, the world of cells and cell controllers.

Ever feel like you are on a treadmill going nowhere? To stay competitive, you've worked overtime, scrimped and saved, bought some automated equipment—some programmable controllers possibly, a CNC machine tool or two, perhaps a robot.

Now suddenly your automation efforts seem inadequate. Now 'integration' not 'automation' is 'in.' So, despite the fact that you've put a lot of effort in getting your computer-controlled machines up and running, they are being labeled 'islands of automation.'

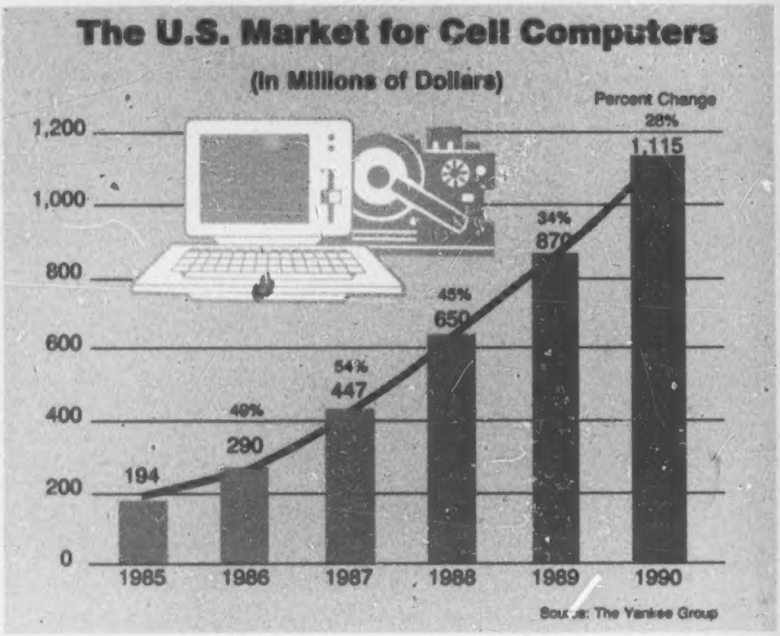
And, like having a cigarette, having islands of automation is no longer cool.

But owning a shop full of stand-alone equipment is no reason to contemplate slitting your wrists. It offers a ready-made platform from which you can integrate isolated production into cooperative work cells.

New competition and rapidly changing markets are demanding that firms again crank up their modernization efforts. Only the flexible integration offered by cells will give the speed and coordination needed to counter bruising off-shore competition.

If devices such as CNC machine tools and programmable controllers (PLCs) represent the the first step in modernizing the factory, a good number of U.S. companies are poised to take the second step: integrating that automation. For most this means combining automation devices into cells.

Central to this effort is the emergence of the cell controller, a


The U.S. Market for Cell Computers

(In Millions of Dollars)

Source: The Yankee Group

computerized supervisor designed to get various machines working in harmony and get timely production data to management.

Fortunately, a diversity of products and services is emerging to meet growing cell control needs. Unfortunately, this hodgepodge of support confuses potential users.

"I think that one of the realities of the cell control market is that it is very much in the embryonic stages," said Don Bell-Irving, manager factory automation marketing, Digital Equipment Corp., Maynard, Mass. "Nobody really knows what a cell controller is. It's different things to different people."

Everyone's Business

With the parameters of cell control so nebulous, everyone is moving into the cell control business. Manufacturers of corporate and departmental computers such as IBM and Digital are pushing their computer and communications expertise down to the cell level, while control manufacturers such as Allen-Bradley and Gould are pushing their shop floor control knowledge up into the cells.

Besides computer and PLC makers, machine tool builders, robot manufacturers, software suppliers, systems integrators, and a raft of others are targeting the cell control market.

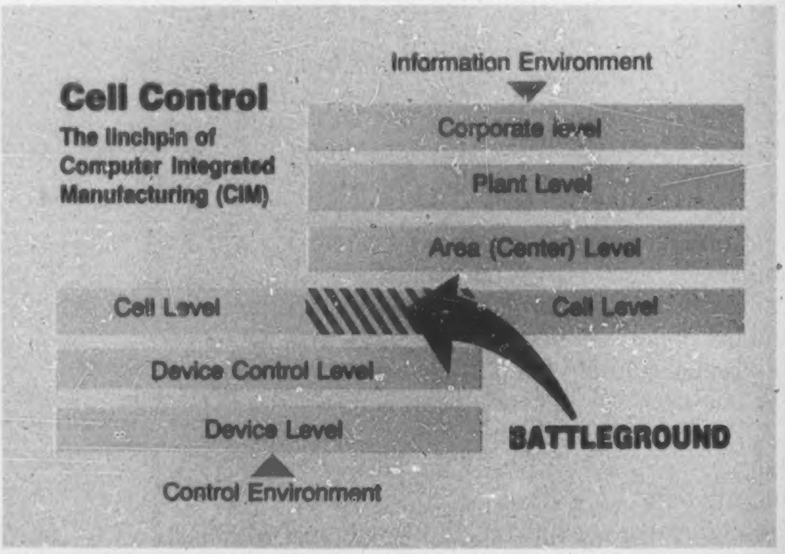
The cell control level, many say, is becoming a real battleground. The reasons for the mad scramble to grab a chunk of this high ground are four-fold:

- The landscape is so ill-defined, almost everyone sees the possibility of staking a claim at least somewhere.
- Of all the levels of automation that are required to integrate a manufacturing operation, the cell level appears to have the most strategic importance as well as the greatest growth potential (see charts, this page). For the cell is the bridge that joins the company's information and production systems. Here is where executive planning and factory control meet head on.
- Whoever controls the cell level, will have a good deal to say about structure of the lower levels of factory automation.
- If the various levels of automation are viewed as stepping stones to computer-integrated manufacturing (CIM), the cell control step is logically the next one for many vendors to address.

Machine tool and PLC builders, spurred by customer requests for integrated offerings, see their growth into cell control as a natural evolution. Similarly, computer firms offering corporate information systems, naturally would like to extend their systems deep into the factory.

Given this diverse crowd of vendors and the still ill-defined landscape of cell control, it is little wonder that many manufacturers are hesitant about proceeding with cell control.

Besides the uncertainty about


Cell Control

The linchpin of Computer Integrated Manufacturing (CIM) what type of cell controller to buy, there is confusion about what it should be doing once installed. For a cell controller's functions are by no means cut and dried.

For example, a cell controller might be used as:

- A manufacturer's communications hub.
- His coordinator and director of shop floor activities.
- The conduit to a broad panorama of devices.
- The collector of production-status information.
- The preparer of data for supervisory front office computers.
- Or the controller of real-time factory floor machines and processes. And this list is by no means complete.

Nevertheless, despite the haziness over what exactly a cell controller does and is, its function can be crystallized to some degree.

John E. Jones, executive vice president, instrumentation and automation systems, Gould, Inc., Rolling Meadows, Ill., divides cell controllers into two types: cell controllers and cell computers.

"I think of cell computers as being information oriented and cell controllers as control oriented," he explained. "Not differentiating between the two functions is causing a lot of confusion."

How vendors view cell control is determined to a large extent by where they are coming from.

Two Worlds

"You have the two worlds that are attempting to make a compromise and what your perspective is determines what your compromise is," observed Dick Omdahl, manager, strategic marketing for automation products, Square D Co., Milwaukee. "If you're from the computer world, you compromise off the real-time aspect of control. If you are from the control world, you compromise in favor of real-time control and eliminate some of the more computer-like functions."

Because of the variety of vendors and the specific needs of specific manufacturers, cell controllers today, for the most part, are niche products for niche markets, but that will change.

The key to successful cell control, according to Interactive Graphics, is the interaction between the employee and the information and control system.

"Today, different people tend to define cell control differently, so the functions within these products are different," observed Mr. Omdahl. "However, I think that is a short term thing. I believe there is going to be more standardization but it will take time."

As Mr. Omdahl notes, companies don't buy a cell controller because they see it as the next step in their factory automation plan but because of a specific need.

For example, an automotive supplier might select a cell controller because the auto company insists that its suppliers keep statistical process control records. Or a welding company that has to continually change its welding parameters might choose cell control as the best way to get its weld schedules down to the welders.

Basic Functions

Yet though cell control today is customized to meet specific needs, cell control requirements fall into several basic areas.

"We feel that there is a pretty generic set of functions that go on in the cell controller, but for the cell controller to be effective, everyone is going to be customized to some degree," explained Jeff Chamberlain, CIM market-development manager for Hewlett Packard's Data Systems Division, Palo Alto, Calif., "so that is why our program involves working with software suppliers to provide some of the basic functions." Then, the necessary customization is left up to systems integrators or the customers themselves.

According to Digital's Mr. Bell-Irving, the two most important basic functions that a cell controller can offer are flexibility and communications.

When deciding how to make a product, firms used to choose production methods that emphasized efficiency and standardization at the expense of flexibility. Today, cell controllers permit both efficiency and flexible production.

"Besides flexibility, today's companies are moving toward integration," said Mr. Bell-Irving. "To run a company economically, you have to coordinate all the different operations within it."

And much of that coordination centers around the cell controller. It must not only coordinate the factory floor but also work with other cell controllers and business planning computers.

"Whatever else it is, a cell controller has to be highly flexible because processes and product mix are going to change," said Mr. Bell-Irving. "And the second absolute requirement we have observed is that it be integratable."

For Jody Kurtzhalts, general manager, Synetics, Milwaukee, the scheduling ability of a cell controller is critical. "At its most basic," she explained, "you need to have a system capable of routing a series of parts."

Synetics software not only offers dynamic machine loading but will optimize work loads as well. For example, if a cell is to make a hundred different parts, and those parts require a variety operations sequences, the software will determine optimum sequencing.

Synetics is a newly formed subsidiary of Kearney & Trecker Corp. It was formed to focus and refine K&T's manufacturing software expertise and adopt it to CIM and cell control demands. That expertise has been accumulating for some 15 years—ever since K&T began selling flexible manufacturing systems.

Already some 5,000 specific software modules have been developed to support some 37 functional tasks, like routing, simulation and inspection.

Inadequate Software

Because of the newness of cell control, one of its problems is a lack of adequate software. A good deal of the software developed today is of the custom variety. Customization is risky, for you never know what you will get until you get it. With time-tested software, K&T and some of the other flexible manufacturing system pioneers believe they have a software edge over the competitors.

The most requested requirements for a cell controller, according to a user survey conducted by the Automation Resource Group, Wellesley, Mass., include capabilities to: communicate; monitor and control; perform management functions (like tool managing and maintenance scheduling); and collect and store data.

One important function left off of the list is the ability of a controller to interact with people.

"The real issue is not just integrating pieces of CIM but integrating people into it," said Deborah Allen, marketing manager, Interactive Images Inc., Woburn, Mass. "Conquering the user interface barrier will be the key determinant of CIM success."

With people in mind, Interactive Images developed EASEL software. The company calls it a user interface development tool. It can be used for cell control, for it has many of the functions of a cell controller such as graphical representation of statistical data, including quality control and statistical process control; data base query, including bill of material and inventory and production order status; data collection applications such as inspection; and production management and control for processes using PLCs.

EASEL, run on an IBM PC, aims at integrating people into computer-integrated manufacturing by allowing workers to enter and retrieve complex information simply by touching customized icons on the computer screen.

And because it is application and hardware independent, the software can serve as a front end to any existing CIM environment.

A final point: maybe the most important one. Despite the focus today on cell control hardware and software, neither should enter the picture when initially considering cellular manufacturing.

"Discussions about specific software and hardware at the conceptual road map level—where you are going to proceed and how you are going to get there—is a tremendous blind alley," cautioned David Lilly, vice president and general manager, automated systems division, Integrated Automation, Alameda, Calif. "A tremendous amount of our creativity goes early on into choosing between technologies, rather than first determining what has to be done. Most projects are ruined by its technology junkies.

"We say we are taking a systems approach to designing our modern factory, but we don't work out the whole architecture of functional assignments for the cells.

"I really think that the local area network issues, the MAP protocol issues, the cell controller hardware issues are distracting us from the basics of how we are going to engineer this thing."

By Robert E. Harvey

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ENERGY PRICES FUEL A PRICE RISE

Sharply higher energy prices spurred a 0.6 jump in seasonally adjusted producer prices for finished goods in January, reversing a slight price drop in December and modest increases for several months before that.

The U.S. Labor Department also noted that the prices for finished energy goods rose 9.9 pct, fueling a 0.7 pct increase for finished consumer goods in January.

In relation to major industries, the index for the net output of the domestic manufacturing sector advanced 0.8 pct in January after recording no change in December and a slight rise in November. The index for capital equipment moved up 0.2 pct in January, after inching up 0.1 pct in December. Prices advanced for aircraft, metal cutting machine tools, and transformers.

In contrast, prices declined for motor vehicles and textile machinery. Passenger cars had a price decline of 0.2 pct, following a 0.2 pct increase in December and a 0.2 drop in November.

Meanwhile, the durable manufacturing materials index registered a 1.0 pct advance for the latest month, with higher prices for hot and cold rolled steel sheets and strip, and copper. Prices for steel mill products rose 1.1 pct in January after no change in the previous month.

Prices in the domestic mining industry climbed 6.4 pct over the month, but were 22.2 pct lower than the year-ago level.

The department's longer range statistics showed that from January 1986 to January 1987, the finished goods price index fell 1.5 pct, and capital equipment prices were up 2.4 pct. But during that period, the index for energy products dropped 31.7 pct, holding down some other price increases.

Latest Month Covered: January 1987

Products	Index Reading For Month (1967 = 100)	Pct Change From Previous Month	Pct Change From Year-Ago Month
Metal Cutting Machine Tools	411.4	+ 0.8	+ 3.2
Metal Forming Machine Tools	443.1	+ 0.2	+ 1.2
Agricultural Machinery & Equip.	341.2	+ 0.4	+ 0.8
Construction Machinery & Equip.	370.8	0	+ 1.6
Oil and Gas Field Machinery	410.4	0	− 3.4
Industrial Material Handling Equip.	297.9	+ 0.1	+ 0.8
Pumps, Compressors & Allied Equip.	364.6	+ 0.2	+ 2.0
Mining Machinery & Equipment	383.8	+ 0.7	+ 0.4
Mechanical Power Transmission Equip.	349.5	+ 0.1	+ 2.8
Automobiles	247.0	− 0.3	+ 7.6
Motor Trucks—Light	324.2	+ 0.1	+ 5.9
Motor Trucks—Heavy	347.0	− 0.3	− 0.7
Railroad Equipment	364.5	0	− 0.6
Fabricated Metal Structural Products	315.9	− 0.3	+ 0.3
Electric Motors	352.0	− 0.2	+ 0.6
Valves & Fittings (Dec. 1982 = 100)	107.7	+ 0.3	+ 1.6
Ball & Roller Bearings	355.9	+ 0.1	+ 0.7
Foundry & Forge Shop Products	363.9	+ 0.2	0
Heating Equipment	271.5	− 0.1	+ 2.6
Plumbing Fixtures & Brass Fittings	323.9	+ 0.5	+ 2.9
Metal Containers	361.4	− 0.3	− 0.1
Internal Combustion Engines	353.9	0	+ 1.6

Data based on U.S. Labor Dept.'s Producer Price Index

MATERIALS PRICES

PRICE & PRODUCTION DATA

(Effective March 2, 1987)

Steel production by districts, thousands of tons (000 omitted)

	Last Week	Two Weeks Ago	Month Ago	Year Ago
Northeast Coast	157	146	119	202
Pittsburgh	199	187	170	251
Youngstown	109	114	110	113
Lake Erie	120	117	111	163
Detroit	156	146	150	150
Chicago	314	342	337	521
Midwest	168	175	163	152
Southern	158	158	138	224
Western	45	45	39	92
U.S. Production	1,426	1,430	1,337	1,868

Source: American Iron & Steel Institute

Lake Superior Ore Prices

51.50% Fe Natural delivered lower Lake ports unless otherwise stated. Rail transportation, handling and unloading may be charged to buyer. Coarse ore 80¢ premium

Pellets (per iron unit natural)	gross-ton 58.0*
Pellets (per iron-unit natural)	gross-ton 59.4**
Pellets (per iron unit natural)	gross-ton 72.45-86.9***
Mesabi, regular-unscreened	gross-ton 32.53
Mesabi, non-bessemer	gross-ton 30.03-31.53

*58.0¢—Mineral Services, Inc. as of 8/13/85. **59.4¢—Inland Steel Mining, 1/1/85 and Pickands Mather, 8/1/85, delivered hold of vessel, upper lake ports. ***72.5¢—U.S. Steel as of 8/16/85. 86.9¢—Oglebay Norton 3/25/82, Hanna Mining and Cleveland Cliffs, 2/26/82

STEEL PRODUCTION, COMPOSITE PRICES

(Effective March 2, 1987)

U.S. Steel Production	Last Week	Two Weeks Ago	To Date 1986	To Date 1985
Net tons, in thousands	1,426	1,430	11,826	14,802
Capability Utilization Rate	66.2	66.4	65.1	70.4

Composite Prices	This Week	Week Ago	Month Ago	Year Ago
Finished Steel Base* (¢/lb.—eff. 1/4/87)	25.236	25.236	25.236	24.607
Pig Iron** (Net ton=2000 lbs.)	$213.00	$213.00	$213.00	$213.00
Scrap No. 1 hvy.*** (Gross ton=2240 lbs.)	$ 74.83	$ 76.50	$ 77.50	$ 73.50
No. 2 bundles	$ 50.50	$ 51.17	$ 51.17	$ 52.83

Scrap Comparison (Gross Ton)

No. 1 steel, Pittsburgh	$ 79.50	$ 80.50	$ 82.50	$ 73.50
No. 1 steel, Philadelphia	70.50	70.50	71.50	72.50
No. 1 steel, Chicago	74.50	78.50	78.50	74.50
No. 1 bundles, Detroit	76.50	83.50	85.50	65.50
Low Phos., Youngstown	80.50	82.50	82.50	73.50
No. 1 mach'y cast., Pgh	74.50	74.50	74.50	73.50
No. 1 mach'y cast., Phila	93.50	93.50	93.50	93.50
No. 1 mach'y cast., Chi	95.50	101.50	101.50	109.50

*Finished Steel Composite: Weighted index of steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips

**Pig Iron Composite: Based on average prices for basic and foundry pig iron at representative producing points within the U.S.

***Steel Scrap Composite: Average of No. 1 hvy. melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago

NONFERROUS PRICES

(Effective March 2, 1987) Prices obtained in trade based on representative tonnages per gross ton delivered to consumer unless otherwise stated

Primary Metal Prices

(cents per lb.)	current price	last price	date of change
Aluminum (LME)	58.75	59.00	3/2/87
Copper (C)	67.50	64.50	2/26/87
Lead	26.00	27.00	2/2/87
Magnesium Ingot	153.00	148.00	12/9/85
Nickel (LME)	171.00	172.00	3/2/87
Zinc	47.00	44.50	10/6/86

ALUMINUM: Avg. for last week & previous week. COPPER (C)=cathode. LEAD: common grade. MAGNESIUM: 99.8% pig delivered. NICKEL: Avg. for last week & previous week. ZINC: high grade

Antimony, American Laredo, Texas	$2.00
Beryllium-aluminum 5% Be, per lb. contained Be	$248.00
Beryllium-copper, per lb. cont. Be	$152.00
Beryllium 97% powder 200	$196.00
Cadmium, ton lots	$1.50
Calcium, ton lots, crown	$3.92
Chromium, 99.5% electro	$4.62
Cobalt, 99%, cathode	$12.50
Gold, per troy oz	$404.25
Indium, per troy oz	$3.25
Iridium, per troy oz	$411.00
Magnesium sticks, 10,000 lbs	$2.12
Mercury, per 76-lb., f.o.b. N.Y.	$200.00-225.00
Molybdenum, lb. tech. moly oxides, 20 lb. MO can	$3.45
Palladium, per troy oz	$123.00
Platinum, per troy oz	$520.00
Rhodium, per troy oz	$1,198.00
Silver ingots, per troy oz	$5.44
Titanium sponge, melt grade	$3.40-3.55
Tungsten powder, hyd red	$9.53-9.85
Vanadium	$6.00
Zirconium sponge	$11.20-17.00

(Per lb. unless otherwise noted)

Straits Tin Price

(U.S. cents per lb. EX-SMELTER, based on daily market in Kuala Lumpur in Malaysian dollars per kilo.)

February 23—300.00
February 24—298.00
February 25—296.00
February 26—298.00
February 27—301.00

Scrap Prices
Brass Mill Scrap

(Cents per lb., over 20,000 lbs. add 1¢ per lb.)

	Solids	Turnings
Copper	55½	50½
Yellow brass	49	48
Red brass	50	46
Comm. bronze	51½	46½
Mang. bronze	38½	37½
Free cutting rod ends	48	47

Custom Smelters Scrap

(Cents per lb., carload lots, del. refinery)

No. 1 copper wire	55
No. 2 copper wire	46
Light copper	40

Ingot Makers Scrap

(Cents per lb., carload lots, del. refinery)

No. 1 copper wire	48
No. 2 copper wire	40
Light copper	33
No. 1 composition	41
No. 1 comp. turnings	41
Hvy. yellow brass solids	29
Hvy. yellow brass turnings	23
Radiators	27

Aluminum

New mixed clips	32 — 33
Old sheet	29 — 30
Old cast	29 — 30
Clean dry borings	30 — 31

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Aluminum

Segregated clippings	29 — 30
Mixed L.C. clips	27 — 28
Old sheets and cast	24 — 25
Borings and turnings	20 — 21
Duraluminum clippings	25 — 26

Copper and Brass

No. 1 copper wire	44 — 47
No. 2 copper wire	35 — 36
Light copper	32 — 33
Radiators	22 — 23
No. 1 composition	36 — 37
No. 1 composition turnings	34 — 35
Cocks and faucets	30 — 31
Clean heavy yellow brass	26 — 28
Brass pipe	26 — 27
New soft brass clippings	39 — 40

Lead

Heavy soft lead	9 — 10
Whole batteries	1 — 2
Type metal	18 — 19
Electrotype	15 — 16

Nickel

Nickel solids	100 —110
Nickel rod ends	100 —110
Nickel sheets, clips	100 —110
Nickel turnings	25 — 35

Zinc

New zinc clippings	14 — 15
Old diecast zinc	10 — 11

MATERIALS PRICES

EFFECTIVE MARCH 2, 1987

(Effective March 2, 1987) Prices obtained in trade based on representative tonnages per gross ton delivered to consumer unless otherwise stated. Prices are the opinions of *Iron Age* editors and correspondents, based on contacts with dealers, brokers, generators and users in the industry on the effective date listed above

Ferrous Scrap Prices

Pittsburgh

No 1 hvy. melting	$ 79.00 to	$ 80.00
No. 2 hvy. melting	69.00 to	70.00
No. 1 dealer bundles	98.00 to	99.00
No. 1 factory bundles (auto)	101.00 to	102.00
No. 2 bundles	45.00 to	46.00
No. 1 busheling	96.00 to	97.00
Machine shop turnings	8.00 to	9.00
Shoveling turnings	46.00 to	47.00
Cast iron borings	45.00 to	46.00
Low phos. punchings plate	99.00 to	100.00
Heavy turnings	69.00 to	70.00
No. 1 RR hvy. melting	84.00 to	85.00
Rails, 2 ft. and under	98.00 to	99.00
Scrap rails, random lgth	87.00 to	88.00
RR specialties	101.00 to	102.00
No. 1 machinery cast	74.00 to	75.00
Cupola cast	67.00 to	68.00
Heavy breakable cast	30.00 to	31.00
Stainless		
18-8 bundles and solids	490.00 to	495.00
18-8 turnings	390.00 to	395.00

Chicago

No. 1 hvy. melting	$ 74.00 to	$ 75.00
No. 2 hvy. melting	70.00 to	71.00
No. 1 dealer bundles	92.00 to	93.00
No. 1 factory bundles (auto)	92.00 to	93.00
No. 2 dealer bundles	60.00 to	61.00
No. 1 busheling	84.00 to	85.00
Shredder scrap	80.00 to	81.00
Machine shop turnings	22.00 to	23.00
Mixed borings and turnings	15.00 to	16.00
Shoveling turnings	25.00 to	26.00
Cast iron borings	40.00 to	41.00
Low phos. forge crop	95.00 to	96.00
Low phos. punchings plate		
1/4 in. and heavier	110.00 to	111.00
Low phos. 2 ft. and under	103.00 to	104.00
No. 1 RR hvy. melting	78.00 to	79.00
Scrap rails random lgth	77.00 to	78.00
Reroller rails	100.00 to	101.00
Rails, 2 ft. and under	94.00 to	95.00
RR couplers and knuckles	75.00 to	76.00
RR car axles	100.00 to	101.00
No. 1 machinery cast	95.00 to	96.00
Cupola cast	85.00 to	86.00
Stove plate	96.00 to	97.00
Steel car wheels	81.00 to	82.00
Stainless		
18-8 bundles and solids	460.00 to	470.00
18-8 turnings	350.00 to	360.00
430 bundles and solids	125.00 to	135.00
430 turnings	85.00 to	95.00

Philadelphia

No. 1 hvy. melting	$ 69.00 to	$ 72.00
No. 2 hvy. melting	61.00 to	64.00
No. 1 dealer bundles	84.00 to	87.00
No. 2 dealer bundles	44.00 to	47.00
No. 1 busheling	81.00 to	84.00
Shredder scrap	84.00 to	87.00
Machine shop turnings	24.00 to	27.00
Mixed borings and turnings	24.00 to	27.00
Shoveling turnings	39.00 to	42.00
Low phos. 5 ft. and under	78.00 to	81.00
Low phos. 2 ft. punchings	96.00 to	99.00
Electric furnace bundles	94.00 to	97.00
RR specialties	80.00 to	83.00
Rails, 2 ft. and under	96.00 to	99.00
Cupola cast	80.00 to	83.00
Heavy breakable cast	52.00 to	55.00
No. 1 machinery cast	92.00 to	95.00

Detroit

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 49.00 to	$ 50.00
No. 2 hvy. melting	48.00 to	49.00
No. 1 dealer bundles	76.00 to	77.00
No. 2 bundles	39.00 to	40.00
No. 1 busheling	74.00 to	75.00
Drop forge flashings	41.00 to	42.00
Machine shop turnings	20.00 to	21.00
Mixed borings and turnings	6.00 to	7.00
Shoveling turnings	20.00 to	21.00
Cast iron borings	20.00 to	21.00
Heavy breakable cast	32.00 to	33.00
Mixed cupola cast	47.00 to	48.00
Automobile cast	71.00 to	72.00
Stainless		
18-8 bundles and solids	440.00 to	450.00
18-8 turnings	290.00 to	300.00
430 bundles and solids	115.00 to	125.00

Youngstown

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 63.00 to	$ 64.00
No. 2 hvy. melting	60.00 to	61.00
No. 1 dealer bundles	85.00 to	86.00
No. 2 dealer bundles	35.00 to	36.00
Machine shop turnings	15.00 to	16.00
Shoveling turnings	15.00 to	16.00
Low phos. plate	80.00 to	81.00
Electric furnace bundles	70.00 to	71.00
Galvanized bundles	67.00 to	68.00

Cleveland

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 59.00 to	$ 60.00
No. 2 hvy. melting	56.00 to	57.00
No. 1 dealer bundles	84.00 to	85.00
No. 1 factory bundles	85.00 to	86.00
No. 2 bundles	34.00 to	35.00
No. 1 busheling	74.00 to	75.00
Machine shop turnings	14.00 to	15.00
Shoveling turnings	14.00 to	15.00
Cast iron borings	19.00 to	20.00
Cut structural & plates,		
5 ft. and under	73.00 to	74.00
Cut structural & plates,		
2 ft. and under	94.00 to	95.00
Low phos. punchings plate	94.00 to	95.00
Foundry steel, 2 ft. & under	58.00 to	59.00
No. 1 RR hvy. melting	65.00 to	66.00
Rails, 2 ft. and under	97.00 to	98.00
Rails, 18 in. and under	99.00 to	100.00
No. 1 machinery cast	85.00 to	86.00
Mixed cast	52.00 to	53.00
Stainless		
18-8 bundles	445.00 to	455.00
18-8 turnings	295.00 to	305.00
430 bundles	120.00 to	130.00

Buffalo

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 55.00 to	$ 56.00
No. 2 hvy. melting	45.00 to	46.00
No. 1 busheling	79.00 to	80.00
No. 1 dealer bundles	79.00 to	80.00
No. 2 bundles	31.00 to	32.00
Machine shop turnings	13.00 to	14.00
Mixed borings and turnings	13.00 to	14.00
Shoveling turnings	19.00 to	20.00
Cast iron borings	27.00 to	28.00
Low phos. plate	80.00 to	81.00
Structural and plate,		
2 ft. and under	82.00 to	83.00
Rails, 2 ft. and under	81.00 to	82.00
Scrap rails, random lgth	63.00 to	64.00
No. 1 machinery cast	76.00 to	77.00
No. 1 cupola cast	71.00 to	72.00

St. Louis

No. 1 hvy. melting	$ 70.00 to	$ 71.00
No. 2 hvy. melting	59.00 to	60.00
No. 1 busheling	84.00 to	85.00
No. 1 dealer bundles	85.00 to	86.00
No. 2 bundles	56.00 to	57.00
Machine shop turnings	17.00 to	18.00
Shoveling turnings	21.00 to	22.00
Cast iron borings	26.00 to	27.00
No. 1 RR hvy. melting	79.00 to	80.00
Rails, random length	76.00 to	77.00
Rails, 5 ft. and under	91.00 to	92.00
RR specialties	79.00 to	80.00
Cupola cast	66.00 to	67.00
Heavy breakable cast	40.00 to	41.00
Stove plate	85.00 to	86.00
Steel car wheels	85.00 to	86.00
Rerolling rails	99.00 to	100.00
Unstripped motor blocks	49.00 to	50.00

Birmingham

No. 1 hvy. melting	$ 73.00 to	$ 74.00
No. 2 hvy. melting	69.00 to	70.00
No. 1 dealer bundles	73.00 to	74.00
No. 2 bundles	49.00 to	50.00
No. 1 busheling	73.00 to	74.00
Shredder scrap	95.00 to	96.00
Machine shop turnings	28.00 to	29.00
Shoveling turnings	39.00 to	40.00
Cast iron borings	36.00 to	37.00
Electric furnace bundles	69.00 to	70.00
Elec. furnace, 3 ft. & under	75.00 to	76.00
Structural and plate, 2 ft.	94.00 to	95.00
Structural and plate, 4 ft.	86.00 to	87.00
No. 1 RR hvy. melting	86.00 to	87.00
Scrap rails, random lgth	80.00 to	81.00
Rails, 2 ft. and under	97.00 to	98.00
Angles and splice bars	86.00 to	87.00
No. 1 cupola cast	82.00 to	83.00
Unstripped motor blocks	74.00 to	75.00

Cincinnati

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 57.00 to	$ 58.00
No. 2 hvy. melting	51.00 to	52.00
No. 1 dealer bundles	79.00 to	80.00
No. 2 bundles	30.00 to	31.00
Machine shop turnings	11.00 to	12.00
Shoveling turnings	14.00 to	15.00
Cast iron borings	24.00 to	25.00
Low phos. 18 in. and under	82.00 to	83.00
Rails, random length	64.00 to	65.00
Rails, 2 ft. and under	84.00 to	85.00
No. 1 cupola cast	66.00 to	67.00
Heavy breakable cast	29.00 to	30.00
Drop broken cast	71.00 to	72.00

New York

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 38.00 to	$ 40.00
No. 2 hvy. melting	31.00 to	32.00
No. 2 dealer bundles	20.00 to	22.00
Mixed borings and turnings	10.00 to	11.00
Machine shop turnings	4.00 to	6.00
Shoveling turnings	10.00 to	12.00
Clean cast chem. borings	35.00 to	36.00
No. 1 machinery cast	79.00 to	80.00
Mixed yard cast	50.00 to	51.00
Heavy breakable cast	10.00 to	12.00
Stainless		
18-8 prepared solids	370.00 to	390.00
18-8 turnings	270.00 to	310.00
430 prepared solids	90.00 to	100.00
430 solids	75.00 to	85.00

Boston

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 49.00 to	$ 51.00
No. 2 hvy. melting	39.00 to	41.00
No. 1 dealer bundles	53.00 to	55.00
No. 2 bundles	32.00 to	34.00
No. 1 busheling	56.00 to	58.00
Shredder scrap	59.00 to	61.00
Machine shop turnings	12.00 to	14.00
Shoveling turnings	18.00 to	20.00
No. 1 machinery cast	72.00 to	77.00
Mixed cupola cast	44.00 to	46.00
Heavy breakable cast	8.00 to	10.00

San Francisco

No. 1 hvy. melting	$ 40.00 to	$ 42.00
No. 2 hvy. melting	34.00 to	36.00
No. 1 dealer bundles	31.00 to	33.00
No. 2 dealer bundles	20.00 to	21.00
Machine shop turnings	8.00 to	9.00
Cast iron borings	8.00 to	9.00
No. 1 cupola cast	80.00 to	82.00

Los Angeles

No. 1 hvy. melting	$ 34.00 to	$ 36.00
No. 2 hvy. melting	28.00 to	30.00
No. 1 dealer bundles	26.00 to	28.00
No. 2 dealer bundles	16.00 to	18.00
Machine shop turnings	7.00 to	8.00
Shoveling turnings	8.00 to	9.00
Cast iron borings	8.00 to	9.00
Elec. furnace, 1 ft. and under		
(foundry)	67.00 to	69.00
No. 1 cupola cast	72.00 to	74.00

Seattle

No. 1 hvy. melting	$ 60.00 to	$ 62.00
No. 2 hvy. melting	51.00 to	53.00
No. 2 bundles	35.00 to	37.00
No. 1 cupola cast	89.00 to	90.00
Mixed yard cast	80.00 to	82.00

Hamilton, Ont.

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 76.00
No. 2 hvy. melting, cut 2 ft. and under	66.00
No. 1 dealer bundles	86.00
No. 2 bundles	58.00
Mixed steel scrap	51.00
Bush. new fact. prep'd	86.00
Bush. new fact. unprep'd	69.00
Machine shop turnings	30.00
Short steel turnings	30.00
Mixed borings and turning	19.00
Cast scrap	97.00

Houston

Brokers buying prices per gross ton on cars

No. 1 hvy. melting	$ 64.00 to	$ 65.00
No. 2 hvy. melting	54.00 to	55.00
No. 2 bundles	33.00 to	34.00
Machine shop turnings	13.00 to	14.00
Crushed turnings	23.00 to	24.00
Shredder scrap	75.00 to	76.00
Cut structural plate, 2 ft. and under	87.00 to	88.00
Cut structural plate, 5 ft. and under	72.00 to	73.00
Unstripped motor blocks	52.00 to	53.00
Cupola cast	83.00 to	84.00